Multimedia Systems for
Campbell Hall, Ruffner Hall, and
Culbreth Hall Classrooms
October 12, 2000
Multimedia Systems for Campbell Hall, Ruffner Hall, and Culbreth Hall Classrooms  
Request for Proposal #SH101200  
October 12, 2000

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Multimedia Systems for Campbell Hall,
Ruffner Hall, and Culbreth Hall Classrooms
Request for Proposal # SH101200
October 12, 2000

This Request for Proposal (RFP) has been posted on Procurement Services web site for your convenience. Addenda and attachments are posted if issued. It is the firm’s responsibility to ensure that the entire RFP package has been reviewed prior to the firm's submittal of a proposal. We encourage you to check the web site frequently for any changes prior to the submittal date. To receive a hard copy of the RFP or addenda (which will be identical to those posted on the web site unless otherwise noted), contact Becky Sims, Contracts Administrator, at 804-924-4530 or email pur-rfp@virginia.edu. For additional public posting information consult Procurement Services web site at http://www.virginia.edu/~pams/PublicPosting.htm. For questions about the content of the RFP, contact the buyer listed in Section VI, Information about this RFP.

I. Overview of the RFP Process

The Rector and Visitors of the University of Virginia (University), a Virginia public corporation, seeks an experienced firm (or firms) to provide Multimedia Systems for the designated classrooms in Campbell Hall, Ruffner Hall, and Culbreth Hall. This RFP is part of a competitive procurement process which helps to serve the University’s best interests. It also provides firms with a fair opportunity for their services to be considered. The process of competitive negotiation being used in this case should not be confused with the different process of competitive sealed bidding. The latter process is usually used where the goods or services being procured can be described precisely and price is generally the determinative factor. With competitive negotiation, however, price is not required to be the determinative factor, although it may be, and the University has the flexibility it needs to negotiate with firms to arrive at a mutually agreeable relationship.

For ease of reference, each firm receiving this RFP is referred to as a “firm” and the firm selected to provide services for the University is referred to as the “Selected Firm.” This RFP states the instructions for submitting proposals, the procedure and criteria by which a firm may be selected, and the contractual terms by which the University proposes to govern the relationship between it and the Selected Firm.
It is the policy of the Commonwealth of Virginia and the University of Virginia to contribute to the establishment, preservation, and strengthening of small businesses and businesses owned by women and minorities, and to encourage their participation in State procurement activities. The Commonwealth and the University encourage firms to provide for the participation of small businesses and businesses owned by women and minorities through partnerships, joint ventures, subcontracts, or other contractual opportunities.

II. Background Discussion and Goals of the University

The University of Virginia, founded by Thomas Jefferson in 1819, is located in Charlottesville, Virginia. A public institution of higher education, the University is charged with teaching, research, public service and patient care. The University has an undergraduate student enrollment of approximately 12,400 and a graduate enrollment of 5,800. U.S. News and World Report has consistently ranked the University as one of the top public institutions among the nation’s top 25 research universities, and among the “best buys” in higher education. The University was awarded over $187 million total research dollars in fiscal year 1999.

In support of its mission and in an effort to maintain the highest quality services for its customers, the University seeks an experienced firm (or firms) to provide Multimedia Systems.

III. Scope of Goods and Services

It is the University’s intent to enter into an Agreement with the Selected Firm for Multimedia Systems, to include the necessary labor, installation materials, goods and services to help the University achieve its goals as outlined in this RFP (the “Goods and Services”). Specific components of the Goods and Services are provided in: Attachment 4a-f, Multimedia Systems Specifications for Campbell Hall Room 107; Attachment 5a-f, Multimedia Systems Specifications for Ruffner Hall, Rooms 223, 281, & 283 and
Additions to Rooms 175 & 187; Attachment 6a-f, Multimedia Systems Specifications for Culbreth Hall, Room 217; and Attachment 7, Drawings. In order to achieve this goal the Selected Firm may be requested to provide those Goods and Services outlined in this section including Attachments 4 through 6.

A. Goods and Services

1. Provide equipment, installation, testing, and placing in service, for discrete, individualized and completely integrated Multimedia Systems in the designated classrooms in Campbell Hall, Ruffner Hall, and Culbreth Hall, including, but not limited to, sound and multimedia equipment (both permanent and portable), as specified on a per-classroom basis. (Note: Classrooms are not identical, and have differing requirements. Classroom differences may be discussed at the Preproposal Conference.)

2. Provide all labor and materials, and make all necessary arrangements, except as specifically noted herein, so that when the Selected Firm has completed the project, the fully functional Multimedia Systems will be turned over to the University. Any errors, omissions, or ambiguities discovered during the installation, testing, or acceptance phases will be brought to the attention of the University’s Multimedia Consultant as listed in Section 18 below, and the Selected Firm will provide a plan of corrective action and a timeline of when the corrective action will be completed. Any drawings, specifications, conditions, or any other facts pertinent to the structural and electrical renovations to these rooms will be given to the University’s Multimedia Consultant for review and approval prior to commencement of any work. Any conduit, fixtures, wiring, labor, or other materials not provided and installed by the University will be the responsibility of the Selected Firm in providing the Multimedia Systems.

3. The Selected Firm will allocate sufficient internal resources (i.e. personnel, equipment, and capital) in order to provide the Goods and Services in the manner and time-frame described in the RFP.
4. The equipment to be provided by the Selected Firm for the multimedia systems will be included as an attachment to any Agreement resulting from this RFP. The multimedia systems equipment will conform to the specifications contained in RFP Attachments 4, 4a, 4b, 4c, 4d, 4e, 5, 5a, 5b, 5c, 5d, 5e, 6, 6a, 6b, 6c, 6d, 6e, as appropriate.

5. Customer Service

a. The Selected Firm will be capable of analyzing the University’s current classroom/auditorium conditions and providing drawings, schematics, suggested equipment lists, etc. to the University’s Multimedia Consultant for review and approval in an effort to meet the University’s goal of providing the highest quality Multimedia Systems for the designated classrooms in Campbell Hall, Ruffner Hall, and Culbreth Hall.

b. The Selected Firm will provide effective procedures for complaint resolution for issues raised by the University to include, but not be limited to, facilitating the University’s prompt access to the Selected Firm’s Project Manager, technical personnel, and management personnel as appropriate for the given issue.

c. The Selected Firm will provide labor and materials during weekends and holidays, if necessary, to complete the Multimedia Systems project on time, at no additional cost to the University.

d. The Selected Firm will provide Energy Star equipment, if available, to the fullest extent possible for any equipment installed in the designated classrooms in Campbell Hall, Ruffner Hall, and Culbreth Hall.

e. The Selected Firm will provide quality assurance for the Goods and Services and will ensure that products are provided from the original equipment manufacturers indicated on the Drawings and specifications listed in the Attachments of this RFP.
6. Virginia Contractor Registration
   a. The Contractors and Subcontractors will comply with the Virginia Contractor’s Registration Law, Title 54, Chapter 11, Code of Virginia, as amended. All nonresident Contractors and Subcontractors submitting Proposals on the work described herein will register with the Department of Labor and Industry under the provisions of Subsection 40.1-30 of the Code of Virginia, as amended.
   b. The Virginia Board of Contractors has interpreted its regulations to mean “a licensed Contractor can propose on a contract which contains work outside his license classification(s) as long as he subcontracts those items for which he is not qualified to licensed Contractors with the appropriate License Classification and the work of the second part is incidental to the contract.” Therefore, the University may, as a part of determining whether a firm is “responsible,” require firms to submit a listing of its subcontractors along with the license number and classification or specialty of each. (See Section V., Contents of Proposal.)

7. Contractor Requirements
   a. The Selected Firm will be a Contractor that has been continuously involved in the installation of multimedia systems for a period of at least 18 months, and is a factory authorized dealer of the submitted manufacturer's products. The Selected Firm (including its proposed and approved specialty subcontractor) will have been a factory authorized dealer of the submitted manufacturer's products for at least 18 months, except in the case of newly acquired product lines. The Selected Firm will be capable of maintaining a Service Department which is able to provide on-site service as required by the University on a continuing basis.
   b. The University may award a single Agreement or multiple Agreements for provision of the Goods and Services in the various
classroom buildings. The use of Subcontractors in specialty areas will be allowed, but the Selected Firm(s) will bear the full and total responsibility for their furnished equipment, workmanship, and system performance. All subcontracted work must be fully documented in the proposal submitted by the firm, including, but not necessarily limited to, the Subcontractor’s name, address, phone number, Virginia Contractor’s Registration No., and extent of work to be performed.

8. Payment and Performance Bonds

At the option of the University, the Selected Firm may be required to provide the University with proposed fees for Payment and Performance Bonds prior to execution of any Agreement resulting from this RFP. If approved by the University, the Selected Firm will immediately obtain and provide to the University labor and materials Payment and Performance Bond(s) from one or more companies authorized to do business in Virginia and acceptable to the University as security for the faithful performance by the Selected Firm under the terms of the Agreement. The Payment and Performance Bonds will each be in an amount no less than the total fees listed in the Agreement and in the form prescribed by the Commonwealth of Virginia. Failure to obtain the required bonds in satisfactory form and substance may be grounds for immediate termination of the Agreement.

9. Equipment and Installation Warranties

The manufacturers of the equipment will warranty their products to be free from defects of material or workmanship for a period of at least one year from the date of system acceptance. Specific products may have longer manufacturer's warranties if specified in: Attachment 4a-f, Multimedia Systems Specifications for Campbell Hall Room 107; Attachment 5a-f, Multimedia Systems Specifications for Ruffner Hall, Rooms 223, 281, & 283 and Additions to Rooms 175 & 187; and Attachment 6a-f, Multimedia
Systems Specifications for Culbreth Hall, Room 217, or if represented as such by the Selected Firm. During the period of this warranty, equipment which proves to be defective will be repaired or replaced at no charge to the University. Unauthorized local repairs to the equipment during the warranty period will relieve the manufacturer of its responsibilities under this warranty. All manufacturers’ warranties will be honored to the full extent of written documentation, as furnished by the manufacturers involved.

The Selected Firm will provide a one-year warranty on the installation of the multimedia systems and all installation materials not otherwise covered above, both for its work and the work of any subcontractors. During the warranty period, repairs or replacement must be completed within 72 hours, or loaner equipment must be provided at no additional charge to the University.

10. Standards and Codes

a. Electrical/Electronic/Multimedia Equipment will be installed in accordance with the latest standards of the National Fire Protection Association (NFPA), the Institute of Electrical and Electronic Engineers (IEEE), and the National Electrical Code (NEC). All work will also comply with the applicable state and municipal laws and codes covering each class of work.

b. All materials, where so required, will conform to the latest issue of standards by the National Electrical Manufacturer’s Association (NEMA), the American National Standards Institute (ANSI), the Institute of Electrical and Electronic Engineers (IEEE), the National Board of Fire Underwriters (NBFU), and the Underwriter’s Laboratories (UL), or other “accepted or approved Testing Laboratory.”
11. Certificate of Installation/Final Inspection
At the conclusion of the installation/integration, the Selected Firm, the University’s Contract Administrator and the University’s Multimedia Consultant, will conduct a final inspection of the work to verify compliance with the specifications contained herein and applicable codes. The Selected Firm will test and demonstrate that all systems are fully operational. Any deficiencies will be promptly and permanently corrected by the Selected Firm at its sole expense prior to final Acceptance of the work.

a. Final Inspection will be scheduled with the Selected Firm for a specific date at which point all of the above tests are to be performed in the presence of the University’s representatives.

b. If the system, or specific items, are not fully operational on the scheduled time and date, and it becomes necessary for the University’s representatives (including its Multimedia Consultant) to return to the site for one or more re-inspections, the Selected Firm will be directly responsible for all additional costs incurred by the University.

c. The date on which the Final Inspection is signed and accepted by all named parties will be considered to be the date of “Acceptance,” and will be the date at which all warranty coverage begins.

12. Alternate Submittals
a. Substitutes or Equals not otherwise noted as acceptable in Attachment 4a-f, Multimedia Systems Specifications for Campbell Hall Room 107; Attachment 5a-f, Multimedia Systems Specifications for Ruffner Hall, Rooms 223, 281, & 283 and Additions to Rooms 175 & 187; and Attachment 6a-f, Multimedia Systems Specifications for Culbreth Hall, Room 217, as appropriate, will be considered only when they are specifically identified as “Substitutes or Equals”, and are accompanied by
sufficient catalog data, specifications, and technical information for evaluation. “Substitute or Equal submittal and review” will not be considered to be “shop drawing review and approval”.

b. On any of the systems or equipment, firms submitting non-specified equipment will include pertinent performance data, charts and drawings showing in what respect the systems or equipment will function in accordance with the specifications, and in what ways they will deviate from the specifications. Failure to submit such documentation will be grounds for rejection of the proposed substitute. (This information will be mandatory as a basis for determining the firm’s intent in meeting the full requirements of this specification, and will be submitted with the proposal. See Section V., Contents of Proposal.)

c. It is understood that any additions or revisions of wiring required by the use of substitute/alternate equipment, whether such wiring be part of the Multimedia Systems contract or of the University electrical contract, will be the responsibility of the firm making the substitution.

d. If required by the University or its Multimedia Consultant, the Selected Firm will provide working samples of substitute equipment, to be delivered to the premises designated, for examination by the Consultant, and such representatives as the University may direct. Handling, shipping, and delivery to, or removal from the site, of any sample required will be the responsibility of the firm. The firm will be responsible for the arrangement of, and any fees associated with, comparative demonstrations required to determine “equal or better” status of proposed substitutes, if so requested by the University.

e. Proposals that fail to address specification requirements or review comments may be rejected.
13. Shop Drawing Review and Approval
   a. Six sets of shop drawings will be furnished for approval prior to ordering or fabrication of the classroom equipment. Drawings will include system risers for the sound and multimedia equipment. Drawings will also be supplied for any “custom-fabricated” controls, devices, or mounts, including materials used. A set of drawings will be returned, appropriately marked, as the Approval Document.
   b. When the installation is complete, the University will be supplied with “As-Built” Drawings, Operations and Maintenance Manuals, and Software documentation, in the quantities, form, and manner detailed in the Specifications for each Classroom Building project/s. Submittal of Final Documentation will be within a time frame not-to-exceed three weeks from date of final system Acceptance.

14. Product Delivery, Storage, and Handling
   The Selected Firm will:
   a. Where applicable, deliver equipment and controls securely wrapped in factory fabricated wooden or fiberboard type containers;
   b. Handle equipment and controls carefully to prevent breakage, denting and scoring finish;
   c. Not install damaged equipment and controls;
   d. Replace and return damaged units to equipment manufacturer;
   e. Store equipment and controls in clean dry spaces. Store in original cartons and protect from dirt, and physical damage.

15. Service Contract
   The Selected Firm may be required to provide the University with an option for an annual “Service Contract” for the multimedia systems, which will take effect after the initial warranty period expires. The Selected
Firm will ideally possess in-house service capabilities, a preventive maintenance program, and a prompt response time capability.

16. Required Delivery and Installation
The Selected Firm will complete delivery and installation for Campbell Hall, Ruffner Hall and Culbreth Hall classrooms, as appropriate, no later than January 15, 2000.

17. Special Installation Schedules and Accessibility
The University anticipates that the classrooms will be available for the Selected Firm to begin its installation of multimedia systems commencing December 19, 2000. Intermittent access to the classrooms will be available before this date as coordinated with the University’s Contract Administrator. The Selected Firm is expected to take class schedules into account with respect to classroom access and acknowledges the potential requirement for provision of the Goods and Services outside of normal business hours at no additional charge.

18. Multimedia Consultant
The University’s Multimedia Consultant on this project is Mr. Cameron Grainger, of Backstage, Inc., Richmond, Virginia. The University’s Multimedia Consultant will advise the University regarding the Goods and Services. Backstage, Inc. will not be available as a supplier of materials, equipment, or services to any firm involved with this RFP. Any questions concerning this RFP must be directed through the Procurement Services as described within this RFP.

IV. Basis of Selection
The University will evaluate proposals and, if a firm is to be selected, select the firm on the basis of:

1. The firm’s plan to assist the University to meet its goals for providing Multimedia Systems for the designated classrooms in Campbell Hall, Ruffner Hall, and Culbreth Hall, as discussed in Section II, Background
Discussion and Goals of the University, and Section III, Scope of Goods and Services;

2. The firm’s relevant experience, qualifications and success in providing the goods and services outlined in this RFP;

3. The firm’s references from institutions of higher education, teaching hospitals, and clients which are comparable to the University;

4. The firm’s financial proposal including but not limited to discounts, service charges and other charges;

5. The quality of the proposal, specifically, responsiveness to requirements and adequacy of information provided;

6. The contractual terms which would govern the relationship between the University and the Selected Firm; and

7. Any other factors relevant to the firm’s capacity and willingness to satisfy the University.

Note: The University reserves the right to award the Agreement for all or part of the Goods and Services to one or more firms.

V. Contents of the Proposal

Proposals should include information outlined in this section. Copies of proposals must be sent to the Issuing Office, Procurement Services, Carruthers Hall, and not to any other office or department whatsoever at the University of Virginia. Firms are not required to submit proposals for all three classroom-building projects. Individual proposals for all project work within a specific classroom building (Campbell Hall, Ruffner Hall or Culbreth Hall) are acceptable.

A. Goods and Services

1. State the firm’s ability to provide the Goods and Services detailed in Section III, Scope of Goods and Services. Provide a brief history of the firm and its experience, qualifications and success in providing these Goods and Services.
2. Describe in detail how the firm plans to provide the Goods and Services detailed in Section III, Scope of Goods and Services.

3. Provide the following contractor information along with a statement acknowledging that such licensing will be maintained throughout the term of any Agreement resulting from this RFP.
   a. Contractor's Registration #: ______________________________
   b. Registration Class: ______________________________
   c. Specialty Codes (as applicable.): ______________________________
   d. Subcontractor's Registration #: ______________________________
      Registration Class: ______________________________
      Specialty Codes (as applicable.): ______________________________
   e. Subcontractor's Registration #: ______________________________
      Registration Class: ______________________________
      Specialty Codes (as applicable.): ______________________________

4. Note: All subcontracted work must be fully documented in the firm’s proposal, including, but not necessarily limited to, the subcontractor’s name, address, phone number, the extent of work to be performed, and the Virginia registration information listed above.

5. Service Contract
   Describe the firm’s proposal for an optional annual service contract, which will take effect after the initial warranty period expires. This proposal should detail the firm’s in-house service capabilities, response time, and preventive maintenance program.

6. Dealer Certification
   Provide evidence of the firm’s status and history as an installer of multimedia systems and as an authorized dealer of the proposed equipment. Provide factory certifications as appropriate.

7. Completion Date
   Provide project completion information for each project in the format below: The firm must acknowledge that it will complete the particular
classroom building project within the time constraints identified in the RFP.

8. Documentation

Attach any supporting documentation required in the RFP. (For example, “Substitute or Equal” data for proposed alternate equipment should be documented by pertinent performance data, charts and drawings showing how the systems or equipment will function in accordance with the specifications in: Attachment 4a-f, Multimedia Systems Specifications for Campbell Hall Room 107; Attachment 5a-f, Multimedia Systems Specifications for Ruffner Hall, Rooms 223, 281, & 283 and Additions to Rooms 175 & 187; Attachment 6a-f, Multimedia Systems Specifications for Culbreth Hall, Room 217; and Attachment 7, Drawings; and in what ways the systems or equipment will deviate from the specifications. Failure to submit such documentation may be grounds for rejection of the proposed substitute.)

B. Firm Information, Personnel, References

1. Provide at least three references comparable to the University for which the firm has provided similar goods and services. Indicate the type of multimedia systems provided and scope of work performed by the firm. Include date of contract, contact names, and phone numbers.

2. Provide information on the Project Manager assigned to work with the University including a description of their work experience in installing sound and multimedia equipment (or suitable resume).

3. Provide a detailed plan of how the firm intends to allocate sufficient internal resources (i.e. personnel, equipment, and capital) to provide the Goods and Services in the manner and time-frame described in the RFP.

C. Financial Proposal

1. Describe the firm’s proposed fees for providing the Goods and Services. Firms must provide separate pricing for multimedia systems in each of the
classroom buildings listed below using the format provided in the appropriate Attachment listed below entitled Proposal Form:

a. Campbell Hall, Room 107 (Attachment 4f, Proposal Form).
b. Ruffner Hall, Rooms 223, 281, & 283 and Additions to Rooms 175 & 187 (Attachment 5f, Proposal Form).
c. Culbreth Hall, Room 217 (Attachment 6f, Proposal Form).

2. Firms should ensure that they separately provide proposed fees for the optional Service Contract(s) which will commence after warranty expiration.

3. The proposed fees must include all shipping costs, travel, labor, materials and any other related expenses necessary to ensure full functionality of multimedia systems and adherence to the specifications contained in:
   Attachment 4a-f, Multimedia Systems Specifications for Campbell Hall Room 107; Attachment 5a-f, Multimedia Systems Specifications for Ruffner Hall, Rooms 223, 281, & 283 and Additions to Rooms 175 & 187; Attachment 6a-f, Multimedia Systems Specifications for Culbreth Hall, Room 217; and Attachment 7, Drawings.

4. Provide proposed fees for appropriate Payment and Performance Bonds to the degree required by the laws of the Commonwealth of Virginia.

D. Contractual Arrangements

1. Provide the University with any form or contract the University may be requested to sign;

2. State the firm’s acceptance of Attachment 1, Mandatory Contractual Provisions; and

3. State the firm’s acceptance, with any proposed modifications, of Attachment 2, Preferred Contractual Provisions.

E. Site Visits

It may be necessary or desirable for the University's evaluation team of less than ten people to travel to a site chosen jointly by the firm and the University to view its operation. Each firm will indicate whether it will reimburse the University for
the reasonable and actual expenses (travel, lodging, meals, etc.) incurred by the University for its travel.

F. Minority Business
Specify whether the firm is a minority firm. The Commonwealth of Virginia’s definition of a minority firm is a firm that is at least 51% owned, operated, and controlled by a minority; or in cases of a publicly-owned business, at least 51% of the stock must be owned by a minority. Such minorities include, but are not limited to, African Americans, Hispanic Americans, Asian Americans, Native Americans, Eskimos, and Aleuts. If the firm is not a minority firm, describe the firm’s partnering relationships with minority firms and how it plans to support the University’s goal to award 5% of its business to minority firms.

G. Other Information
Provide any other information which the University should consider in evaluating the firm's proposal.

VI. Information about this RFP
A. Procurement Schedule
Here is a brief schedule for this procurement, specifying the important dates and milestones:

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<th>Event</th>
<th>Date</th>
<th>Event</th>
<th>Date</th>
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<tbody>
<tr>
<td>Issue Date of RFP</td>
<td>10/12/00</td>
<td>Oral Presentations &amp; Negotiations</td>
<td>11/8/00 - 11/13/00</td>
</tr>
<tr>
<td>Preproposal Conference</td>
<td>10/23/00</td>
<td>Contract Award</td>
<td>11/28/00</td>
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<td>Deadline for Receipt of Proposals</td>
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B. Issuance of RFP and Questions

The Issuing Office for this RFP is:

Procurement Services
University of Virginia
1001 North Emmet Street
P.O. Box 400202
Charlottesville, Virginia 22904-4202

Attention: Steve Heldreth, Senior Purchasing Analyst
Telephone: (804) 924-4217
Fax: (804) 982-2690
TDD: (804) 982-HEAR
Email: heldreth@virginia.edu

Any questions concerning this RFP will be directed to Steve Heldreth as listed above and not to any other person at the University. The University will determine whether any addenda should be issued as a result of any question or other matters raised.

C. Preproposal Conference

A conference for firms receiving this RFP will be held on Monday, October 23, 2000 at 2:00 p.m. in Campbell Hall, Room 217, Charlottesville, Virginia (map viewed at this web site: http://www.virginia.edu/Map/).

Attendance at this conference is advised if your firm wishes to raise any questions in connection with this RFP. The University intends to present general information which may be helpful in the preparation of proposals and to offer firms the opportunity to ask questions concerning this RFP. No firm may have more than two representatives present at the Preproposal Conference.

Firms planning to attend the Preproposal Conference should notify Becky Sims, (804) 924-1346, no later than 3:00 p.m. on Thursday, October 19, 2000 of the names and titles of the individuals who will attend.
D. Proposal Deadline

All proposals must be received at the Issuing Office by 3:00 p.m., Thursday, November 2, 2000. Six copies of each proposal must be provided in individual, bound volumes.

E. Oral Presentations and Negotiations

An oral presentation by two or more firms may be required after written proposals are received by the University. If the University requires such a presentation, the Issuing Office will schedule a time and place. Each firm should be prepared to discuss and substantiate any of the areas of the proposal it submitted, its own qualifications for the services required and any other area of interest relative to its proposal. Negotiations with two or more firms will be conducted by the University on the firms' financial proposals and proposed terms and conditions. Oral presentations and negotiations are tentatively scheduled for November 8-10, 2000 and November 13, 2000.

F. Communications Between the University and the firms Regarding This Request for Proposal

Informal Communications

From the date of receipt of this Request for Proposal by each firm until a binding contractual agreement exists with the Selected Firm and all other firms have been notified, or when the University rejects all proposals, informal communications regarding this procurement will cease. Informal communications will include but not be limited to:

1. Requests from the firms to any department at the University, with the exception of Procurement Services for information, comments, speculation, etc.;

2. Requests from any department at the University, or any employee of the University, with the exception of Procurement Services for information, comments, speculation, etc.
Formal Communications
From the date of receipt of this Request for Proposal by each firm until a binding contractual agreement exists with the Selected Firm and all other firms have been notified, or when the University rejects all proposals, all communications between the University and the firms will be formal, or as provided for in this Request for Proposal, or as requested by Procurement Services. Formal communications will include but not be limited to:
1. Preproposal Conference
2. Oral presentations
3. Site visits, Interviews, etc.

Any failure to adhere to the provisions set forth in Informal Communications and the Formal Communications sections above may result in the rejection of any firm's proposal or cancellation of this RFP.

G. Formation of the Agreement with the Selected Firm
All proposals received will be carefully evaluated by the University. The University will then select two or more firms deemed to be fully qualified and best suited among those submitting proposals, on the basis of evaluation criteria described in this RFP. The University will then conduct negotiations with each of these firms. After negotiations have been conducted, the University will select the firm which, in its opinion, has made the best proposal. The University will award the contract to the Selected Firm by either of these methods:
1. Accept the proposal as written by issuing a written notice to the Selected Firm which refers to this RFP and accepts all or part of the proposal submitted in response to it and/or any addenda submitted during the negotiation process; or
2. Execute a mutually satisfactory written agreement based on this RFP, the proposal submitted, and the negotiations concerning these.
3. If the University determines in writing and in its sole discretion that only one firm is fully qualified, or that one firm is clearly more highly qualified
than the others under consideration, it may decide to negotiate and award a contract to that firm.

Because the University may use alternative (1) above, each firm must include in its written proposal all requirements, terms or conditions it may have, and should not assume that an opportunity will exist to add such matters after the proposal is submitted.

Firms should also note that, as described in Section H, Provisions Deemed Included in the Proposal, certain matters will automatically be deemed part of the proposal.

H. Provisions Deemed Included in the Proposal

The University will consider each proposal to include not only the matters expressly stated in the proposal as requested in Section V, Contents of the Proposal, but also other provisions which consist of two different types: those which are "mandatory" and cannot be changed by a firm in its proposal; and those which are "preferred" by the University, but which a firm may wish to alter by expressly and specifically so stating in its proposal.

The University includes mandatory provisions so that all proposals will be governed by the same basic contractual terms. The University encourages any firm which feels that a mandatory provision is unreasonable to contact the University before proposals are due so the University can consider amending the provision. The University includes preferred provisions so that any difference between the firm and the University's preferred contractual provisions can be considered during the University's evaluation of proposals.

1. Mandatory Provisions

Each proposal received by the University in response to this RFP will automatically be deemed to include the firm's agreement to the provisions of (a) and (b) below. Although such provisions will govern the firm's
proposals as submitted, the University and one or more firms may later mutually agree to amend such provisions, such as when additional time is needed to consider proposals, or when contractual negotiations or performance indicate that such amendments are appropriate.

a. The proposal constitutes an offer by the firm which will remain open and irrevocable for a period of 120 days from the deadline for submitting proposals as stated in Section C, Proposal Deadline.

b. If selected by the University, the provisions governing the firm's performance will include all the provisions of Attachment 1, Mandatory Contractual Provisions.


Unless a firm expressly and specifically provides otherwise in its written proposal, the proposal received by the University in response to this RFP will automatically be deemed to include the firm's agreement to these provisions:

a. The firm consents to the University contacting and obtaining any information relevant to this RFP from the references and others identified by the firm in its proposal, as well as from any other persons, firms, or organizations which the University wishes to contact; and

b. If selected by the University, the provisions governing the firm's performance will include all the provisions of Attachment 2, Preferred Contractual Provisions.

I. Rejection of Proposals

The University reserves the right to reject any or all proposals received. Nonacceptance of a firm's proposal will mean that one or more proposals were deemed more advantageous to the University or that all proposals were rejected. Firms whose proposals are not accepted will be notified after a binding contractual agreement between the University and the Selected Firm exists, or when the University rejects all proposals.
J. Virginia Freedom of Information Act

Except as provided below, once an award is announced, all proposals submitted in response to this RFP will be open to the inspection of any interested person, firm or corporation, in accordance with the Virginia Freedom of Information Act. Trade secrets or proprietary information submitted by firms as part of its proposal will not be subject to public disclosure under the Virginia Freedom of Information Act; however, the firm must invoke the protections of this section prior to or upon submission of its proposal, and must identify the specific data or other materials to be protected and state the reasons why protection is necessary. Firms may not request that its entire proposal be treated as proprietary information.
Attachment 1
Mandatory Contractual Provisions

A. Nondiscrimination
During the performance of this Agreement, the Selected Firm will comply with the contract provisions contained in Section 11-51 (1) & (2) of the Code of Virginia or any successor provisions which may be applicable to this Agreement.

B. Conflict of Interests
The Selected Firm represents to the University that its entering into this Agreement with the University does not entail any violation of the Virginia State and Local Government Conflict of Interests Act.

C. Assignment
Neither party to this Agreement will have the right to assign this Agreement in whole or in part without the prior written consent of the other.

D. Amendments
No amendment of this Agreement will be effective unless it is reduced to writing and executed by the University's Director of Procurement Services and by the individual signing the Selected Firm's proposal or by other individuals named by either party as specified in Section E, Notices below. If the Selected Firm deviates from the terms of this Agreement without a written amendment, it does so at its own risk.

E. Notices
All notices will be given in writing and deemed given when delivered to, or deposited in the U.S. Postal Service mail, certified mail return receipt requested, and addressed to the other party as shown below.
If to the University:
Eric N. Denby, C. P. M.
Director of Procurement Services
Carruthers Hall
University of Virginia
1001 North Emmet Street
P.O. Box 400202
Charlottesville, Virginia 22904-4202

If to the Selected Firm:
The person signing the Selected Firm's proposal in response to the University's RFP, at
the Selected Firm's address indicated in such proposal; or to such other person or address
as either may designate for itself in writing and provide to the other.

F. Independent Contractor
Selected Firm is not an employee of the University, but is engaged as an independent
contractor. The Selected Firm will indemnify and hold harmless the Commonwealth of
Virginia, the University, and its employees and agents, with respect to all withholding,
Social Security, unemployment compensation and all other taxes or amounts of any kind
relating to the Selected Firm's performance of this Agreement. Nothing in this
Agreement will be construed as authority for the Selected Firm to make commitments
which will bind the University, or to otherwise act on behalf of the University, except as
the University may expressly authorize in writing.

G. Worker's Compensation and Employers Liability
The Selected Firm will comply with all federal or state laws and regulations pertaining to
Worker's Compensation Requirements for insured or self-insured programs.

H. Drug-Free Workplace
The Selected Firm, its agents and employees are prohibited, under the terms of this
Agreement and the Commonwealth of Virginia, Department of Personnel and Training
Policy Number 1.02 executed by Governor Lawrence Douglas Wilder on July 1, 1991,
from manufacturing, distributing, dispensing, possessing, or using any unlawful or
unauthorized drugs or alcohol while on University property.
During the performance of this Agreement, the Selected Firm agrees to 1) provide a drug-free workplace for the Selected Firm's employees; 2) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the Selected Firm's workplace and specifying the actions that will be taken against employees for violations of such prohibition; 3) state in all solicitations or advertisements for employees placed by or on behalf of the Selected Firm that it maintains a drug-free workplace; and 4) include the provisions of the foregoing clauses in every subcontract or purchase order of over $10,000, so that the provisions will be binding upon each subcontractor or vendor.

For the purposes of this section, "drug-free workplace" means a site for the performance of work done in connection with a specific agreement awarded to a Selected Firm, the employees of whom are prohibited from engaging in the unlawful manufacturing, sale, distribution, dispensation, possession or use of any controlled substance or marijuana during the performance of the agreement.
Attachment 2
Preferred Contractual Provisions

A. Goods and Services
During the term of this Agreement, the Selected Firm will provide for the University the goods and services offered to the University by the firm in its proposal and/or any addenda to its proposal and as specified by the University when it selected the firm.

B. Term of Agreement
The term of this Agreement will be for a minimum period of one year, commencing when the Agreement has been fully executed by the University, and ending upon expiration of the equipment manufacturers’ warranties. If agreeable to the Selected Firm, the University may renew the Agreement to purchase additional future goods and services on the same terms and conditions, for two additional one-year periods. The Selected Firm and the University will mutually agree at least 30 days prior to each renewal option whether to renew the terms of this Agreement.

C. Contract Administrator
The University will identify a Contract Administrator for any Agreement which results from this RFP. The individual will be the point of contact at the University for day-to-day operations, but cannot approve amendments to the Agreement or price changes.

D. Waiver
No waiver of any right will be deemed a continuing waiver, and no failure on the part of either party to exercise wholly or in part any right will prevent a later exercise of such or any other right.

E. Indemnification
The Selected Firm will indemnify and hold harmless The Commonwealth of Virginia, The Rector and Visitors of the University of Virginia, and their agents, employees and officials from any and all costs, damage or loss, claims, liability, damages, expenses
(including, without limitation, attorneys' fees and expenses) caused by or arising out of
the performance or non performance of the Agreement by the Selected Firm or its agents
or subcontractors, including the provision of any services or products. The Selected Firm
warrants that the products, goods and services provided the University may be used by
the University without being in violation of any copyright, patent or similar property right
or claim by others and will defend, indemnify and save the University (its employees and
agents) from and against any such claim.

F. Governing Law
This Agreement will be governed in all respects by the laws of the Commonwealth of
Virginia.

G. Termination
If the Selected Firm fails to provide quality goods and services in a professional manner,
solely as determined by the University, and, upon receipt of notice from the University,
does not correct the deficiency, to the University's satisfaction within a reasonable period
of time, not to exceed 30 calendar days unless otherwise agreed to by both parties, the
University reserves the right to terminate this Agreement by giving written notice to the
Selected Firm.

H. Non-Appropriation
Funding for any Agreement between the University and a Selected Firm is dependent at
all times upon the appropriation of funds by the Virginia General Assembly and/or any
other organization of the Commonwealth authorized to appropriate such funds. In the
event that funding to support this Agreement is not appropriated, whether in whole or in
part, then the Agreement may be terminated effective the last day for which appropriated
funding is available.
I. Right of Audit
The University reserves the right to audit or cause to be audited the Selected Firm's books and accounts regarding the University's account at any time during the term of this Agreement and for five years thereafter.

J. Contractual Claims
This Agreement is subject to the University's policy on Contractual Claims which is provided as Attachment 3, Procedure for Resolution of Contractual Claims.

K. Insurance
Listed below is the insurance which the Selected Firm must maintain under any Agreement resulting from this RFP. Each Firm will propose insurance which meets or exceeds the needs of the University. No Agreement will be executed by the University until the Firm satisfies the insurance requirements of the University. The Selected Firm may be required to provide the University with a valid Certificate of Insurance before providing any goods or services to the University. The University reserves the right to approve any insurance proposed by the Selected Firm.

Commercial/Comprehensive General Liability:
The Selected Firm and any Subcontractor will provide a minimum Limit of Liability for bodily injury and property damage of $500,000 per person/occurrence with coverage for:

- [X] Premises/Operations
- [X] Contractual
- [X] Independent Contractors
- [X] Personal Injury
- [X] Environmental Impairment
- [X] Property/Fire Legal

Automobile Insurance:
The Selected Firm and any Subcontractor will provide a minimum Limit of Liability for bodily injury of $100,000/$300,000 per person/occurrence and property damage of $100,000 per occurrence with the following coverages for vehicles operated by their employees.
Any Automobile  Owned and Non-Owned Automobiles
Garage Liability

Additional Insured:
If the University requests to be named as an Additional Insured, the proper name is: "The Commonwealth of Virginia, and the Rector and Visitors of the University of Virginia, its officers, employees and agents."

L. Use of Agreement by Third Parties
If agreeable with the Selected Firm, these organizations may have access to any Agreement resulting from this RFP: 1) Any University related foundation, 2) Any institution of higher education which is a member of the Virginia Association of State College and University Purchasing Professionals (VASCUPP). A current list of VASCUPP members can be found on Procurement Services website at: http://www.virginia.edu/~pams/Links.htm 3) City of Charlottesville and County of Albemarle, and 4) Piedmont Virginia Community College. The Selected Firm will respond promptly to a request from any of these organizations for access to the Agreement, but is NOT required to enter into an equivalent agreement with the organization. A Firm's willingness to provide this access to these organizations will not be a consideration in awarding this RFP. Although the organizations may have access to the Agreement, their entry into any equivalent agreement with the Selected Firm is strictly optional.

If an organization chooses to enter into an equivalent agreement, it will so notify the Selected Firm in writing, and will proceed to execute such an agreement. The University will have no responsibility whatsoever for payment of invoices rendered to the organization, resolution of problems, or administration of contractual claims. The Selected Firm, at the request of the University, will provide usage reports for all VASCUPP members accessing the Agreement. The University anticipates requiring such reports quarterly. The University's sole intent is to provide other organizations with access to the University's Agreements and to provide Selected Firms with opportunities
to do business with other organizations. It is understood and agreed that the University is not responsible for the acts or omissions of any VASCUPP member, and will not be considered in default of the Agreement no matter the circumstances.

M. Favored Nations
The Selected Firm represents that the prices, terms, warranties, and benefits specified in its proposal are comparable to or better than the equivalent terms being offered by the firm to any present customer.

N. The University's Authorized Representatives
The only persons who are or will be authorized to speak or act for the University in any way with respect to this Agreement are those whose positions or names have been specifically designated in writing to Selected Firm by the University's Director of Procurement Services.

O. Purchasing Manual
This Agreement is subject to the provisions of the Commonwealth of Virginia "Purchasing Manual for Institutions of Higher Education and Their Vendors" and any subsequent revisions, which is available on Procurement Services web site at: http://www.virginia.edu/~pams/Purman.htm

P. Copyrights
Unless expressly agreed to the contrary in writing, all documents, reports, writings, video images, photographs or papers of any nature prepared by the Selected Firm (or its subcontractors) in performing an Agreement will not be disclosed to any other person or entity without the written permission of the University, and the University will own all copyrights thereto.

Q. Minority Business Reporting
The Selected Firm will identify and fairly consider minority firms for subcontracting opportunities when qualified minority firms are available to perform a given task in
performing for the University under the resulting Agreement. The Selected Firm will submit a quarterly minority business report to the University by the 15th of the month following each calendar quarter, specifically the months of April, July, October, and January. The Selected Firm will submit the quarterly minority business reports to:

Contracts Administrator
University of Virginia
Procurement Services
Carruthers Hall, PO Box 400202
1001 North Emmet Street
Charlottesville, Virginia 22904-4202

The quarterly minority business reports will contain this information:
1. Minority firms name, address and phone number with which the Selected Firm has contracted over the specified quarterly period.
2. Contact person at the minority firm who has knowledge of the specified information.
3. Type of goods and/or services provided over the specified period of time.
4. Total amount paid to the minority firm as it relates to the University’s account.

R. Acceptance
Acceptance will encompass testing and observation of the multimedia systems in the classroom(s). The University’s Contract Administrator will determine if: 1) the specifications from: Attachment 4a-f, Multimedia Systems Specifications for Campbell Hall Room 107; Attachment 5a-f, Multimedia Systems Specifications for Ruffner Hall, Rooms 223, 281, & 283 and Additions to Rooms 175 & 187; Attachment 6a-f, Multimedia Systems Specifications for Culbreth Hall, Room 217; and Attachment 7, Drawings as appropriate have been met, shortly after installation and integration of the multimedia systems. In the event that the University does not accept the Goods and Services, the University may elect to require the Selected Firm to provide replacement Goods and Services or terminate the Agreement.

The University’s Contract Administrator will be responsible for determining the University’s Acceptance of the Goods and Services. Acceptance will not occur until after the Selected Firm notifies the University that the following are completed: 1) the
installation of the multimedia systems; and 2) the complete integration of the multimedia systems into the respective classroom(s). The University’s Contract Administrator will be the sole representative of the University and will have sole authority to act on the University’s behalf with regard to Acceptance; provided; however, that in the event of a dispute regarding any material aspect of Acceptance unable to be resolved by the University’s Contract Administrator, then the procedures in Attachment 3, Procedure for Resolution of Contractual Claims, will be followed.

S. Year 2000 Compliance
The Selected Firm represents that the Goods and Services are completely Year 2000 compliant, meaning that all fields which require a date will accept and correctly process any entries of the year “2000” and beyond.

T. Project Manager
The Selected Firm agrees to provide an individual (“Project Manager”) to implement, perform, and manage all Services. The University must approve the appointment of the Project Manager prior to execution of the Agreement. The Project Manager will be the University’s primary contact, although the Project Manager will be assisted by other members of the Selected Firm’s staff in completing key activities. To ensure consistent project management and supervision, the Project Manager will attend all project meetings as requested by the University, and will visit and inspect the project site at least twice a week during active installation or testing periods.

In the event that the Project Manager or any other individual responsible for the University’s account, is no longer employed by the Selected Firm, is unavailable for any reason, or is performing in an unsatisfactory manner as determined by the University’s Contract Administrator, the Selected Firm will propose a replacement for that individual within a reasonable time frame, so as not to significantly delay the provision of Services to the University. The University reserves the right to approve the replacement, or to cancel the Agreement. If a proposed replacement is accepted by the University, the
replacement will provide the Services at rates no higher than the rates of the original individual and in accordance with all terms and conditions specified in this Agreement.

U. Payment Terms

The University will make payment to the Selected Firm net 30 days after acceptance of Goods and Services and receipt of invoice.

V. Future Goods and Services

The University reserves the right to have the Selected Firm provide additional goods and services under the same pricing, terms, and conditions to make modifications or enhancements to the multimedia systems.
Attachment 3
Procedure for Resolution of Contractual Claims

Section 11-69 of the Virginia Public Procurement Act requires contractors with the University to submit any claims, whether for money or other relief, in writing no later than 60 days after final payment, however, written notice of the contractors intention to file such a claim will have been given at the time of the occurrence or beginning of the work upon which the claim is based.

The University's procedure for deciding such contractual claims is:

A. The Selected Firm must provide the written claim to:
   Assistant Director of Procurement Services
   University of Virginia
   1001 North Emmet Street
   P. O. Box 400202
   Charlottesville, Virginia  22904-4202

B. Although the Selected Firm may, if it chooses, attempt to resolve its claim by dealing with a University department other than the one stated in Section A above, the Selected Firm must submit any unresolved claim in writing no later than 60 days after final payment to the Assistant Director of Procurement Services if it wishes to pursue its claim.

C. Upon receiving the written claim, the Assistant Director of Procurement Services will review the written materials relating to the claim and decide whether to discuss the merits of the claim with the Selected Firm. If such discussion is to be held, the Assistant Director of Procurement Services will contact the Selected Firm and arrange such discussion. The manner of conducting such discussion will be as the Assistant Director and the Selected Firm mutually agree.
D. The Assistant Director of Procurement Services will mail his or her decision to the Selected Firm within 60 days after receipt of the claim. The decision will state the reason for granting or denying the claim.

E. The Selected Firm may appeal the decision to:

   Director of Procurement Services  
   University of Virginia  
   Carruthers Hall  
   1001 North Emmet Street  
   P.O. Box 400202  
   Charlottesville, Virginia  22904-4202

by providing a written statement explaining the basis of the appeal, within 15 days after the Selected Firm's receipt of the decision.

F. Upon receiving the written appeal, the Director of Procurement Services will review the written materials relating to the claim and decide whether to discuss the merits of the claim with the Selected Firm. If such discussion is to be held, the Director of Procurement Services will contact the Selected Firm and arrange such discussion. The manner of conducting such discussion will be as the Director of Procurement Services and the Selected Firm mutually agree.

G. The Director of Procurement Services will mail his or her decision to the Selected Firm within 60 days after the Director of Procurement Services receipt of the appeal. The decision will state the reasons for granting or denying the appeal.
Attachment 4
Multimedia Systems Specifications
for Campbell Hall
Room 107
I. Scope

A. Description
   1. Wall-Mounted Speaker Systems as noted in the specifications and on the Drawings.
   2. A Rack-Mounted Amplifier mounted in each of the Media Cabinets (furnished by University as part of the General Contract), containing any necessary support electronics, as specified herein and shown on the Drawings, for Room 107. University-furnished Media Cabinets are equipped with standard 19” rack-rail mounting systems.
   3. Peripheral Equipment and Accessories, as noted in the specifications and on the Drawings.

B. Performance Criteria
   The Sound Systems herein specified are basic guidelines, indicating minimum required functionality and performance criteria. Firms must satisfy the fit, form, and function of the basic designs, but may present viable alternative approaches as their primary bid. Such presentations must be accompanied by a complete proposed Bill of Materials (all major items), and System Risers and/or line drawings indicating system connectivity, and verification that all basic design criteria are being satisfied.

C. Work By Others
   Certain provisions have been made for conduit, junction boxes, furniture cutouts, and AC power in the existing University Renovation Work. It will be the responsibility of all firms to review these provisions thoroughly. Any additional work, either conduit, cutting, patching, etc. necessary to install the firm’s proposed system, and return an area to it’s current finished state, will be the sole responsibility of the firm, and will be included in their price.
II. Wall-Mounted Speaker System (1 System Required)

A. For Speech Reinforcement and Program Playback in Room 107, furnish and install two wall-mounted speakers at the front of the room, on either side of the projection screen (coordinate mounting location with Multimedia Consultant and University Architect). The Selected Firm will furnish speaker and all custom rigging hardware at each location. (As required by submitted product.)

B. The loudspeaker will be of wall-mount design, consisting of a 135mm (5-1/4 in) low frequency transducer, 19mm (3/4 in) high frequency transducer, and frequency-dividing network installed in a ported enclosure. The low frequency voice coil will be 25 mm (1 in) in diameter.

C. Performance specifications of a typical production unit will be as follows:
   1. Usable frequency response will extend from 80 Hz to 15 kHz (10 dB below rated sensitivity, in half-space, with no external equalization).
   2. The loudspeaker will be equipped with a transformer for use in either 70.7V or 100V distributed-line sound systems with taps selectable by rotary switch. Taps will be nominally 3.7W @ 70V (7.5W @ 100V), 7.5W @ 70V (15W @ 100V), 15W @ 70V (30W @ 100V), and 30W @ 70V (not used @ 100V).
   3. The frequency-dividing network will have a crossover frequency of 3.0 kHz.
   4. Rated power capacity of the components and network will be at least 150 watts continuous program power, defined as 3dB above a test signal of filtered random noise conforming to international standard IEC268-5 (shaped pink noise with a peak-to-average ratio of 6dB), for 100 continuous hours duration.
   5. The system will be protected against damage from occasional over-powering via full range series lamps that limits the power to the network and transducers.
6. The high frequency transducer will be horn-loaded to more evenly cover a nominal 90° horizontal by 90° vertical area.

D. Mechanical specifications of a typical production unit will be as follows:
1. The enclosure will be constructed of high-impact polystyrene for protection against the elements in outdoor applications, and for paintability. The grille will be completely zinc-coated for resistance against rusting, will be bake-painted black, and will be secured via screws to keep it in place when facing downward.
2. The low frequency transducer will have a polypropylene-coated cone and a butyl rubber surround which will extend seamlessly over the edge of the speaker frame for protection against the elements.
3. The high frequency transducer will be constructed of polycarbonate, reinforced with a titanium film for additional weather resistance. The system will withstand Mil Spec 810 testing with specified time durations for exposure to the following environments with no effect on its acoustical performance or structural integrity: salt spray (method 509.3), temperature -19° C to 49°C (method 501.3 and 502.3), 95% humidity (method 507.3) and ultra-violet (method 505.3). The system will have an IEC 529 splash proof rating of IP-X4.
4. For theft deterrence, the installation access area will be hidden behind a snap-out cover, and the access area will be on the front of the loudspeaker for ease of installation and adjustment.
5. The loudspeaker will be rotatable over a minimum of ±35° in all directions via a ball-type mounting system. The ball mechanism will be internal to the cabinet to allow low-profile mounting and better stability via a short moment arm. The logo will be rotatable for proper orientation when the loudspeaker is mounted horizontally or vertically.
6. The external wiring connectors will be spring loaded and gold plated, and will accept bare wire, single or dual banana-type connectors with 19 mm (3/4 in) spacing.
7. Overall cabinet dimensions will be no greater than 236 mm (9.3 in) high by 188 mm (7.4 in) wide by 148 mm (5.8 in) deep and will weigh no more than 3.6 kg (8 lbs).

8. The finish will be paintable textured.

E. The specified system will be the JBL Model Control 25T with included Invisiball™ mounting system.

F. The specified loudspeaker was chosen for its high-performance, ease of installation and service, and clean appearance.

G. Important: All wiring for speakers, regardless of actual mounting conditions, will be furnished for use in air-handling spaces.

H. Acceptable “equals” will include the Electro-Voice S-40T series, or equivalent models as manufactured by EAW, Tannoy, or Bose. Each of these “equal” series must be furnished with all the required components to meet the specified form, fit, and function of the specified unit.

I. The Selected Firm will coordinate the exact location of the speakers in the room with the Multimedia Consultant, accommodating existing conditions. All wiring to and from the individual speakers will be enclosed in metallic or non-metallic raceway wherever possible.

III. Rackmount Mixer/Amplifier (one required)

A. For each specified classroom, furnish and install a Rackmount Modular Mixer/Amplifier system, capable of mixing up to three microphones, and four line input sources. Unit will also be furnished with an independent, transformer-isolated output. Amplifier section will be capable of supplying up to 150 Watts or greater into a 70-Volt speaker system.
B. Modular Chassis Specifications:

1. The mixer amplifier will have eight modular input channels and one dedicated program input.
2. The master section will include one master volume level control, two EQ controls providing 10 dB of boost or cut at 100 Hz and 10 kHz, a “contour” switch providing 6 dB of boost at 100 Hz and 6 dB of boost at 10 kHz, and a green status LED.
3. Internal muting will be accomplished at the modular level by means of two dedicated mute lines. External muting will be accomplished via screw terminals on the back panel.
4. Provision for an external master volume control will be made through barrier strip connections on the back panel.
5. The unit will be packaged in a rugged metal chassis 17” wide by 3.5” high by 15.5” deep.
6. The unit will be furnished with standard rack-mounting hardware.
7. The unit will operate from 120 volts AC, 60 Hz power.
8. The internal amplifier will be capable of delivering 150 watts RMS into 4 ohms and 8 ohms, as well as providing 25-volt and 70-volt line outputs. The unit will be capable of delivering rated power from 20 Hz to 20 kHz ±1 dB into 4 ohms at its direct output at less than 0.5% distortion with system hum and noise at least 77 dB below rated output.

C. Input Modules

1. The Standard Mic Input Module (three required) will provide a transformer-balanced mic preamp, screw-terminal input, mute capability, and selectable phantom power. This module to be used for the microphone-level output of the Audio Interface Panel, specified elsewhere.
2. The Balanced Bridging Line Input Modules (four required) will provide a transformer-balanced input, screw-terminal connections, and muting
capability. Where required, the Input Module will be fitted with a custom resistive-combining network for connection to stereo signal sources.

3. The Balanced Line Output Module 6dB will provide a transformer-balanced output to screw-terminal connections. This module will be for future recording or broadcast capability.

D. The Specified Unit will be the Peavey Architectural Acoustics Division model MMA™ 8150T, or equal, with three MPT-S Standard Mic Input Module, four BTM-S Balanced Line Input Modules, and one TLO-S Balanced Line Output Module. Unit will also be furnished with appropriate rack-mounting hardware.

E. “Equal” series must be furnished with all the required components to meet the specified form, fit, and function of the specified unit.

F. The System Equalizer is intended to be installed in the unbalanced, high-impedance signal-processing loop of the Mixer/Amplifier in these classrooms. The Selected Firm should be prepared to use isolation transformers in this signal path IF required to prevent ground loops. The cost for this/these potential additional item/s should be considered in the firm’s proposal on this project.

G. Unit will be mounted in the University-installed Media Cabinet. Standard 19” rack mounting hardware is incorporated into the Media Cabinet.

IV. System Equalizer 6dB

A. For each classroom, furnish and install a programmable 1/3-Octave Graphic Equalizer with integral Automatic Parametric Notch Filtering for Feedback Suppression. This device will be inserted between the Mixer and the Amplifier sections of the Mixer/Amplifier product, using the signal-processing loop I/O feature.
B. The System Equalizer is a single channel signal processor that combines an equalizer, feedback reducer, limiter and delay in a single, half-rack enclosure. The unit is designed to be installed in the sound reinforcement signal path to allow equalization of the overall sound system response and automatically detect and control acoustical feedback. The equalizer of the unit can be set to act as a 30–band graphic or a 10–band parametric equalizer. The 1/3-octave graphic equalizer can boost up to 6dB or cut 12 dB for each band. The parametric equalizer offers adjustable frequency, up to 6 dB of boost or 18 dB of cut, and up to a two-octave bandwidth. The feedback reducer of the unit automatically inserts narrow notch filters at detected feedback frequencies. These notch filters stop a sound system from feeding back, but are narrow enough so their effect on audio quality is minimized. The feedback detection algorithm constantly searches for feedback, with or without the presence of program audio.

1. Hardware Features
   b. 48 kHz sampling rate provides flat response to 20 kHz.
   c. Onboard Scenes can be selected via front panel buttons.
   d. ½ rack space chassis allows rack mounting of one or two units in a single rack space with no sagging or bending.
   e. Link Interface allows multiple Link devices to be controlled with a single computer.
   f. There are no internal batteries. Settings and DSP program are stored in internal EEPROM.
   g. Electronically balanced input features combination ¼” and XLR connector and can be used with balanced or unbalanced outputs.
   h. Independently driven, cross-coupled, balanced ¼” and XLR outputs can be used with balanced or unbalanced inputs, without signal loss.
   i. Input and output levels are +4 dBu/–10 dBV DIP-switch-selectable.
j. Processor engine will feature full 24-bit internal processing.
k. RS-232 interface allows external computer control and firmware updates.
l. Internal linear power supply is switchable between 120 and 230 Vac.
m. Solid-state bypass eliminates unreliable mechanical relays.

2. Software Features
   a. Adaptive Notch Filter algorithm (patent pending) automatically detects feedback and deploys up to 10 narrow band notch filters.
   b. A tamper-proof equalizer can be switched between 30-band graphic or 10-band parametric equalizer.
   c. The graphic equalizer is a constant-Q, 30-band, 1/3-octave graphic equalizer. It can boost up to 6 dB or cut 12 dB for each band.
   d. The parametric equalizer offers 10 filters with adjustable frequency, up to 6 dB of boost or 18 dB of cut, and up to a two-octave bandwidth.
   e. Up to 1.3 seconds of Digital Delay.
   f. Front and back panels both feature lockout controls.
   g. The Response Curve Viewer displays frequency response of the feedback reducer, equalizer, or both.
   h. 10 scenes can be stored on board. Multiple scenes can be stored to floppy or hard disk.
   i. The Limiter provides added protection to external speakers and amplifiers.

C. Specifications
   1. Frequency Response: 20 to 20k Hz, ±1.0 dB re 1 kHz
   2. Dynamic Range: 104 dB minimum, A-weighted, 20 Hz to 20 kHz
   3. Sampling Rate: 48 kHz
   4. Digital-to-Analog, Analog-to-Digital Conversion: 20 bit resolution
   5. Voltage Gain:
a. 1 dB ± 1 dB (power off)
b. 0 dB ± 2 dB (equal input and output sensitivities)
c. 12 dB ± 2 dB (input –10 dBV, output +4 dBu)
d. 12 dB ± 2 dB (input +4 dBu, output –10 dBV)

6. Impedance:
a. Input: 47 ± 20% actual
b. Output: 120 ± 20% actual

7. Input Clipping Level:
a. +18 dBu minimum (at +4 dBu setting)
b. +4 dBV minimum (at –10 dBV setting)

8. Output Clipping Level:
a. +18 dBu minimum (at +4 dBu setting)
b. +4 dBV minimum (at –10 dBV setting)

9. Total Harmonic Distortion: < 0.05% at 1 kHz, +4 dBu, 20 to 20 kHz

10. LED Signal Indicators:
a. Clip: 6 dB down from input clipping

11. Propagation Delay from Input to Output: 1.0 ms, all filters set to Flat (0 ms delay setting)

12. Polarity:
a. Input to output: non-inverting
b. XLR: pin 2 positive with respect to pin 3
c. ¼-in. TRS: tip positive with respect to ring

13. Feedback Filters:
a. Ten 1/10-octave adaptive notch filters from 60 Hz to 20 kHz
b. Deployed to 1 Hz resolution of feedback frequency
c. Deployed in depths of 3 dB, 6 dB, 9 dB, 12 dB, and 18 dB (12.5 d. Low Q in graphic EQ mode) attenuation
d. Filter shape variable between HI-Q and LOW-Q

14. Graphic Equalizer:
a. Frequency Bands: 30 bands on ISO, 1 / 3 -octave centers
b. Filter Type: 1/3-octave, constant Q
c. Maximum Boost: 6 dB per band  
d. Maximum Cut: 12 dB per band  
e. High- and low-pass filters: 12 dB/octave nominal

15. Parametric Equalizer:
   a. Frequency Bands: 10 bands, variable frequency, variable Q  
   b. Boost/Cut Range: +6 dB to –18 dB per band  
   c. Q Range: 1/40-octave to 2-octave  
   d. Shelf/Rolloff Filters:
      • Shelf: +6 to –18 dB per filter  
      • Rolloff: 6 dB, 12 dB, 18 dB, or 24 dB per octave nominal

16. Delay:
   a. Up to 1.3 seconds

17. Limiter:
   a. Threshold: –60 dB to –0.5 dB, 0.5 dB resolution  
   b. Attack: 1 ms to 200 ms  
   c. Decay: 50 ms to 1000 ms  
   d. Ratio: Infinity to 1

18. Operating Voltage:
   a. 120 Vac, 50/60 Hz, 75 mA max

19. Temperature Range:
   a. Operating: –7° to 49° C (20° to 140° F)

20. Dimensions:
   a. 219 mm x 137 mm x 44.5 mm  
   b. 8-5/8 in. x 5-3/8 in. x 1-3/4 in.

21. Weight:
   a. 930 g (2.05 lbs.)

D. The Specified Unit will be the Shure Model DFR11EQ-V5, or equal.

E. Acceptable “equals” will include the comparable products from the following manufacturers that either meet or exceed these specifications. Acceptable
manufacturers will be Sabine, Inc, Rane, Biamp, BSS, and Peavey MediaMatrix. Any substitutions must meet the fit, form, and function of the specified product, and include any additional mounting hardware required. The use of processors that employ manual hardware-controlled operation will not be acceptable.

F. The Selected Firm will provide to the University, upon completion of the installation, the Configuration Software and the individualized setup files for each of the two classrooms.

V. Microphone/Audio Interface systems

A. Wired Condenser Lavalier Microphone 6dB
   1. Furnish one standard, wired condenser lavalier microphone.
   2. The product specified incorporates the following features.
      a. Interchangeable cartridges that provide an optimal choice for each application.
      b. Rotatable tie clip that pivots in 90° increments for placement flexibility.
      c. Supplied snap-fit foam windscreen that controls breath noise and stays on securely.
      d. Balanced, transformerless output for increased immunity to noise over long cable runs.
      e. Supplied dual tie clip holds two microphones for dual micing applications.
      f. Type of microphone will be an electret condenser, cardiod pickup pattern, frequency response 50 to 17,000 Hz, sensitivity –53.5 dB, maximum SPL 123 dB, and signal-to-noise ratio 70.5 dB (referenced at 94 dB-SPL). Unit will be phantom-powered by 11 to 52 VDC @ 2.0 mA maximum. Unit will be furnished with a properly terminated cable, minimum 4’ in length. Unit will also be furnished with a 25’ balanced microphone extension cable.
3. The specified product will be the Shure Model MX185, or equal.
4. Acceptable “equals” will include the comparable products from other manufacturers that either meet or exceed these specifications. Acceptable manufacturers will include Electro-Voice, AKG, Audio-Technica, Sennheiser, Sony, Telex and Beyerdynamic. Any substitutions must meet the fit, form, and function of the specified product.

B. Audio Interface Panel 6dB
1. For each classroom, furnish and install one Audio Interface Panel, which will be installed on a University-furnished standard 2-Gang NEMA wall box. This device will be mounted on the classroom wall, or on the Media Cabinet, depending on the individual classroom, at the location designated on the drawings, or as approved by the Multimedia Consultant.
2. The product specified incorporates the following features.
   a. The signal splitting/impedance matching unit will be suitable for interfacing (1) unbalanced high- or low-impedance source to one balanced or floating low-impedance (1.0K ohm nominal) microphone preamplifier input.
   b. There will be one ¼” (6.3mm) 2-conductor phone jack, and two RCA phone jacks to provide input for the source. There will be a 16-ohm, 5.0-watt load resistor to accommodate speaker-level sources. There will be a Left + Right resistive mixer summing the RCA inputs to accommodate line-level sources. The output will be a balanced, low-impedance, mic level signal, which will be brought to a barrier strip. This section of the panel will include a 10K-ohm level control, with a 0-10 calibrated knob, for further signal level matching.
   c. There will be one 3-pin female XLR-type connector, independent of the above, for pass-thru connection of low-impedance mics.
   d. The primary electrostatic shield will be connected to the source input ground and to the mounting plate. The secondary
electrostatic shield will be connected to pin 1 of the low-impedance XLR output. There will be a ground lift switch to allow the shields to be connected together or isolated as required. The XLR output connector will be wired with pin 2 “hot” or “in phase” with respect to the input, and pin 3 “cold” or “out-of-phase”.

e. The Interface will be furnished on a single two-gang standard NEMA Wall Plate. Epoxy silk-screening will identify control functions. Switches will be of the miniature “rocker” type and will be recessed.

3. The specified signal splitting/impedance matching unit will be a Pro-Co Monoface AVP-1V Audio-Visual Interface.

4. Acceptable “equals” will include the comparable products from other manufacturers that either meet or exceed these specifications. Any substitutions must meet the fit, form, and function of the specified product.

VI. Audio Wire and Cable

A. Speaker wiring will be 18 ga. or larger for 70 Volt distribution, 14 ga. or larger for low-Z speaker lines, and 22 ga. or larger shielded, twisted-pair for microphone/line levels. The use of multi-core cables is encouraged wherever practical. For this project, the use of plenum-rated cable is required.

B. All new cable runs to microphone, line, or speaker junction boxes will include a minimum of 20% spares, for future use if required. If all existing cables in a conduit are used in this project, additional spares will be installed to comply with this requirement.

C. All conduits used by the Selected Firm will be left with a pull-string installed.

D. All cable “home runs” must be continuous, with no splices.
VII. Sound System Installation

A. General
2. It is the University’s intent that the operation of this system be as simple and intuitive as possible. To that end, Firms proposing alternate equipment should exercise due caution in overly complicating their proposal.

B. Field Quality and Control
1. The Selected Firm must examine areas and conditions under which sound equipment and controls are to be installed and notify Multimedia Consultant in writing of any conditions detrimental to the proper completion of the work. The Selected Firm will not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to both parties.
2. All wiring and equipment must be new, in factory sealed cartons, prior to its installation on the job.
3. The Selected Firm will maintain a Project Foreman for the job, who will remain the same throughout the period of installation and acceptance, unless changes are required due to illness or other causes beyond the Selected Firm’s control.

C. Installation
1. System Grounding
   a. The wiring and shielding of all signal cables will be maintained insulated and ungrounded until deliberate connection is made at one, and only one, point, as per an overall grounding plan.
b. The above provision will be modified when unbalanced lines, or coaxial-unbalanced cable systems are employed, where applicable.

2. All system work, both inside and outside of the Media Cabinets, and junction boxes, will be subject to inspection and approval with respect to neatness, good engineering practices, selection and use of materials, and professional appearance. All cables will be labeled at both ends, and on the system drawings (as-built), for ease of servicing and/or future modifications. All controls will be clearly labeled as to function and nominal setting. All labeling and marking will be complete and in place prior to Final Testing.

3. All wires connecting to binding posts, terminals, or barrier strips will be fitted with compression lugs, sized properly for the wire and termination point. The use of wire-nuts, or other free-floating methods of connection will not be allowed, except for speaker connections.

4. Provisions have been made in the conduit layout to minimize the need to run signals from the different systems in the same pipe. Wherever feasible, within the limitations of the conduit layout, sound system wiring should be run in dedicated pipes, and under no circumstances should run in any conduit with high-voltage AC wiring.

5. All conduit systems, cabinets, racks, or other sound equipment must be grounded properly. Where PVC conduit is used, a continuous ground conductor, no less than #12 Copper, will be installed through the conduit to connect equipment grounds at the termination points, or bond racks and/or conduit.

6. The Selected Firm will label all devices, panels, jacks, and controls as to their functionality. Labels will be internal (insert labels for buttons, and similar), directly engraved, silk-screened, or engraved on Lamacoid-type permanent-adhesive labels. The Selected Firm will coordinate the labeling, choice of names or icons, and placement with the Multimedia Consultant and the Project Coordinator for ITC. No labels will be applied or finalized without signed approval by the University’s Project
Coordinator, or their designated representative. It is the desire of the University to keep the naming or identification of devices, jacks, and controls as intuitive and simple as possible.

The use of “tape” style labels will not be acceptable for this project.

VIII. Proof-of-Performance & Testing

A. The Selected Firm will, in the presence of University and/or any designated representative of University, and the Multimedia Consultant, demonstrate all items and functions of the new sound systems, showing them to be fully functional and capable of performing the tasks required.

B. In operation, the sound systems will have no audible buzzes, clicks, pops, or other noises that might detract from the planned functions in the facility. The Selected Firm will demonstrate system noise levels to the University, certifying compliance with this requirement. The Sound Systems must be demonstrated with all other Multimedia systems active, especially the classroom Lighting, to verify that there is no audible “dimmer noise” or other system noises that might occur in normal operation.

C. All required measurements noted hereafter must be done in the presence of University, or a designated representative of University, and the Multimedia Consultant. All equipment used in making measurements must be fully documented and approved prior to testing, for acceptance by the Multimedia Consultant. Equipment not meeting acceptable standards will not be allowed and The Selected Firm will furnish acceptable equipment at their own expense.

D. Wall-Mounted Speaker System Frequency Response

1. For Room 107, System Frequency Response will be “optimized” for maximum gain-before-feedback and intelligibility in the speech range, using the installed system equalizer, to the response curve designated in
Item 2. However, it should be noted that full-range audio playback from a VCR and other possible sources WILL be handled by the same speaker system, and this should be considered in the final equalization choices.

2. The recommended frequency response will be nominally flat, +/- 3 dB, from 100 Hz.-4000 Hz., with a gradual 2 dB/octave rolloff above that point. This will be designated the “House Curve”. The “House Curve” will be fully documented in print, and made available to the Multimedia Consultant at the time of Final Testing, certifying compliance with these requirements. Acceptable types of test equipment that may be utilized are laboratory-grade 1/3-Octave Real-Time Analyzers (w/printout capability), dual-channel FFT Analyzers, TDS analyzers (TEF, MLSSA, SYSID), or warble-tone generators with averaging filters and chart recorder. Swept sine wave measurements will not be acceptable for this purpose. Manually graphed measurements will not be acceptable for this purpose.

E. System Phasing
Using acceptable methods of polarity testing, The Selected Firm will certify that all microphones and speakers are properly and additively phased. A checklist will be made available to the Multimedia Consultant at the time of Final Testing, certifying that polarity testing has been done on all items.

F. Individual Source Testing
The Selected Firm will, in the presence of all attendees, demonstrate and verify the proper performance of the Wired Mics, the Audio Interface, VCR audio, and the audio from a computer (the Selected Firm-furnished laptop, if University-furnished computer is not available at the time of testing.). Appropriate levels will be set and suitably marked for all major local signal sources prior to Final Testing (note that these may need to be adjusted in the testing phase).
Attachment 4b
Video Systems

I. Scope

A. Description
1. This section includes all Multimedia Video/Graphics Equipment. Included in this section will be an XGA LCD Video/Graphics Projector, a VHS/S-VHS Recorder/Player, a Video/Graphics System Switcher/Scaler, a Broadband Tuner, a Visual Presenter, an internal Computer Interface for University-furnished local PC, and a cabinet-mounted Computer Interface in the quantities as noted in the specifications and on the Drawings.
2. Peripheral Equipment and Accessories, as noted in the specifications and on the Drawings.
3. The Selected Firm is responsible for furnishing fully operational systems to University on completion of this project. Items not specifically listed in this section, but required for proper operation of the systems herein described, will be the responsibility of the Selected Firm to provide as part of the package.

B. Performance Criteria
The Video Systems herein specified are basic guidelines, indicating minimum required functionality and performance criteria. Firms must satisfy the fit, form, and function of the basic designs, but may present viable alternative approaches as their primary bid. Such presentations must be accompanied by a complete proposed Bill of Materials (all major items), and System Risers and/or line drawings indicating system connectivity, and verification that all basic design criteria are being satisfied.

C. Work By Others
Certain provisions have been made for conduit, junction boxes, furniture cutouts, and AC power in the existing University Renovation Work. It will be the
responsibility of all firms to review these provisions thoroughly. Of specific note should be that the various wall and cabinet-mounted junction boxes and conduit runs are being furnished and installed by the University, and are as noted on those drawings and specifications. Any additional work, either conduit, cutting, patching, etc. necessary to install the firm’s proposed system, and return an area to it’s current finished state, will be the sole responsibility of the firm, and will be included in their price.

II. Video System Equipment

A. Video Projectors 6dB

1. For each classroom, furnish and install one wall-mounted LCD Color Multimedia Projector. The Projector will be located at the approximate designated point on the Drawings, and will be securely mounted to a shelf on the rear wall of the room. Projector will also be secured to its mount in such a fashion as to discourage theft or tampering.

2. The actual fixed location of each projector will be determined by the Selected Firm and approved by the Multimedia Consultant prior to installation. No mounting will be commenced without this prior determination and approval. The Selected Firm will ensure that the projector is mounted level, rigid, and at a mounting height suitable for projection on the furnished screens with no keystoning effects. Any mounting that may affect the structural aspects of the room (ceiling grid, duct work, etc.) must be approved by the University’s Facilities Management Dept. representative prior to commencement of installation.

3. The specified product incorporates the following features.
   a. Display Technology: 1.3” polysilicon; TFT LCD x 3
   b. Resolution: XGA 1024 x 768
   c. Resolutions Supported: XGA (1024 x 768), Fit-to-View display of VGA (640 x 480), SVGA (800 x 600), SXGA (1280 x 1024), MAC
d. Brightness: 2200 ANSI lumens

e. Contrast Ratio: 350:1 (ANSI 100:1)

f. Computer Compatibility: IBM PC, PS/2, Pentium and
SUN, SGI, IBM, HP, DEC, and X-Terminals, Apple
Macintosh, Power Macintosh, and PowerBook families

g. Video Compatibility: NTSC, NTSC 4.43, PAL, PAL-M, PAL-N,
SECAM, HDTV

h. Sources: 2 RGB computer, 2 audio, 1 composite video, 1 S-video,
1 component/HDTV Video

i. H-Sync Range: 15 to 100 KHz

j. V-Sync Range: 50 to 100 Hz

k. Dot Clock: 165 MHz

l. Aspect Ratio: std: 4:3 - wide: 16:9

m. Image Size (Diagonal): 30” to 400”

n. Lens: Power zoom and focus lens 1.3:1 ratio; Focal length: 1.9” to
2.47” , F 1.8 to F 2.1

o. Projection Distance (From Screen): 4.6 ft to 47.2 ft


q. Lamp: 200 watt (UHP)

r. Audio: 3W + 3W RMS stereo

s. Remote Control: Laser F/X wireless IR remote with mouse control
and laser pointer

t. Dimensions: 10.2” W x 15.4” L x 6.3” H

u. Weight: 15.2 lbs.

v. Power Consumption: 300 watts

w. Power Requirements: 100 to 120V / 220 to 240V at 50/60 Hz

x. Operating Temperature (Sea Level): 41 F to 95 F (5 C to 35 C)

y. Approvals: FCC Class A (U.S.), UL, c-UL (Canada), CE

z. Warranty: three year parts and labor (excluding lamp); 90 days
lamp
4. The specified LCD Projector will be the Sanyo Model PLC-XP20N, comparable models (equal) from Proxima or Eiki, or acceptable “equals” as defined below (subject to Item 7).

5. The LCD Projector will be supplied with a NEMA-Enclosure Series-Mode Surge Suppressor, which will be the Surge-X Model SX15-NE (see http://www.surgex.com). The use of Shunt-Mode Surge Suppressors will not be acceptable. The Surge Suppressor will be installed by the University, in series with the University-supplied AC outlet designated for the projector. The Selected Firm will be responsible for furnishing the specified Surge Suppressor to the University Facilities Management Division for installation. The University’s Project Coordinator will arrange coordination of delivery.

6. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product. Other manufacturers whose products “may” be “equal” include Toshiba, Epson, In-Focus, Barco, NEC, Sharp and Sony. However, the Firm specifying one of these potential “equals” must provide with their bid a “detailed” description showing how their product differs from the specified unit, and what advantages/disadvantages it may have.

Products proposed which are not capable of “true” or “native” XGA resolution will not be acceptable.

7. NOTE: The University has purchased a reasonable quantity of the same manufacture or type Projector as herein specified. ITC staff and University faculty have been trained in its operation, and are currently familiar with its features and capabilities. ITC wishes to continue the use of this type unless compelling reasons can be presented for making a change. Therefore, preference will be given to those firms furnishing this line item “as specified”. Firms wishing to submit “equals” must provide all of the information noted above, as well as an additional narrative
explaining the advantages to the University which might prove more beneficial than the continuity of models as described herein.

B. Multimedia Input Plate / Computer Interface (one required)
   1. Furnish one Multimedia Input Plate / Computer Interface. This device will be permanently Media Cabinet-mounted (see University dwgs.) and will be used to interface portable computers or other RGB video sources to the projection system.
   2. The Interface will be a high-performance computer video interface for analog video signals including VGA, SVGA, XGA, MAC, SUN and other high-resolution workstations. The unit will have a modular faceplate designed to accept A/V connector plates, allowing the unit to also act as a customizable A/V connector plate. The unit will mount in the wall of the media cabinet, with or without a backbox, as required by the furnished unit. The University has NOT provided a backbox in the Media Cabinet design. The unit will be furnished with a White finish for Media Cabinet mounting.
   3. The Interface will perform the following two primary functions:
      a. Signal Splitting - allows the simultaneous connection and viewing of both the computer’s local monitor and a second output device such as a large screen data projector or monitor.
      b. Physical Interfacing - Computers employ many different types of video output connectors, making it difficult to hook up computers directly to data projection devices. The Interface simplifies interfacing, routing, and switching tasks by acting as universal adapters. Through the use of removable input cables, the Interface can be attached to different computers and will provide a video output signal on five BNC connectors that can easily be connected to an RGB display device. The output signal format may be set to any of the following formats: RGBHV (default), RGS, and RGsB.
4. The specified product incorporates the following features.
   a. Installation Design - unit mounts in a wall, floor box, conference table, podium or other A/V furniture
   b. 300 MHz (-3dB) RGB video bandwidth
   c. ADSP™ Advanced Digital Sync Processing™, or equivalent, to ensure sync compatibility with digital displays such as LCD projectors.
   d. Active PC audio interfacing, to provide a buffered, balanced stereo output to the audio system
   e. Horizontal shift control
   f. Composite or separate horizontal and vertical sync (DIP switch-selectable)
   g. Sync on green output (DIP switch-selectable)
   h. Serration pulse removal (DIP switch-selectable)
   i. DDSP™ Digital Display Sync Processing™, or equivalent, to ensure sync stability with LCD projectors
   j. ID bit termination on pins 4 and 11
   k. Installation plate for use in existing walls without the need for masonry boxes
   l. Four spaces for Architectural Adapter Plates for signal pass-through connectors

5. Compatibility:
   a. Input Signals: The Interface will accept high-resolution video signals from virtually any computer that outputs an analog video signal. The unit will work with signals at virtually any resolution and refresh rate. Compatible computer video signals include VGA, SVGA, XGA, MAC, SUN, SGI and other high-resolution computers outputting an analog video signal. Input signal compatibility parameters are listed below.
      • Video Signal: Analog RGB Video
      • Signal format: RGBHV, RGBS, RGsB, RsGsBs
6. Performance Specifications:

a. Video input
   - Number/signal type: 1 analog RGBHV, RGBS, RGsB, RsGsBs
   - Connectors: (1) 15-pin HD male (Mac and Sun/SGI to VGA adapter cables are available)
   - Nominal level: Analog — 0.7V p-p
   - Minimum/maximum levels: Analog — 0.3V to 1.5V p-p
   - Horizontal frequency: 15 kHz to 130 kHz
   - Vertical frequency: 30 Hz to 120 Hz

b. Audio input
   - Number/type: (1) PC level stereo, unbalanced
   - Connectors: (1) 3.5 mm stereo jack, 2 channel
   - Impedance: 10 k-ohms, DC coupled
   - Minimum level: 100mV

c. Sync Input type: RGBHV TTL (+/-), RGBS TTL (+/-), RGsB 0.3V (-), RsGsBs 1.3V (-)

d. Video throughput
   - Gain: Unity, 0.725V p-p with 50% peaking, 0.750V p-p with 100% peaking
   - Bandwidth: 300 MHz (-3dB)

e. Video output
• Number/signal type: 1 analog RGBHV, RGBS, RGsB
• Connectors: 5 BNC female; 15-pin HD female (buffered local monitor output)
• Nominal level: Unity, 0.725V p-p with 50% peaking, 0.750V p-p with 100% peaking

f. Audio output
• Number/type: 1 stereo (2 channel), balanced/unbalanced
• Connectors: 3.5 mm stereo captive screw terminal
• Impedance: 50 ohms unbalanced, 100 ohms balanced

g. Sync Output type: RGBHV, RGBS, RGsB (switch-selectable)
h. Sync Polarity: When RGBHV is input, polarity follows input; and jumper is set to follow, otherwise negative; RGBS, RGsB negative

7. Mechanical Specifications:
a. Power: 12 to 24VAC or VDC, 0.5 A, 5 watts, external
b. Enclosure type: Metal
c. Faceplate: 4.5" H x 8.33" W
d. Enclosure dimensions: 2.5" H x 3.7" W x 1.74" D
e. Shipping weight: 3 lbs (1.4 kg)
f. Approvals: UL, CUL, CE, FCC Class A

8. The specified unit will be the Extron RGB 558 Architectural Universal, 15-Pin HD Input, Mountable Interface with Audio, ADSP™ and Optional Architectural Plates, or equal product by Inline.

9. The specified units will be furnished and installed with one each Extron Model 70-107-26 Combination Pass-through Plate (or equal by Inline), and Extron Model 70-103-21 XLR 3-Pin Female Module (or equal by Inline). Color will match Interface unit.

10. The specified units will be furnished with one Extron 26-491-03 HD15 Laptop Breakout Cable w/Audio, 12’ in length, or equal product by Inline.

11. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified
product. Note that a junction box is not being furnished and installed by the University.

C. High Resolution Computer Interface 6dB

1. For Room 107, furnish and install one ea. High Resolution Computer Interface. Unit will be installed inside the Media Cabinet and used in conjunction with University-furnished Local PC. The RGB output of the unit will connect to an input on the Video Switcher/Scaler, as noted on the drawings. The Buffered Monitor Output will feed to a University-furnished Local PC Monitor.
   a. The University will furnish the Local PC and the Local Flat-Panel LCD Monitor.
   b. The Selected Firm will be responsible for all cabling between these two devices and their proposed equipment complement.
   c. Provision has been made for a blank panel on the side of the Media Cabinet for mounting an external HD15 connector - to be used for connection to the University-furnished Local Monitor.

2. The Computer Interface is a dedicated high resolution, 300 mHz RGB bandwidth, VGA, SVGA, XGA, SXGA, VESA, & XGA-2 compatible interface, designed to provide high-resolution performance for vertical scan rates from 30-125 Hz. A separate buffered workstation monitor output (15 pin HD) will be included.

3. The product specified incorporates the following features:
   a. VGA, SVGA, XGA, SXGA, VESA, & XGA-2 compatible computer-video interface (using 15 pin HD connector)
   b. 300 MHz RGB video bandwidth (-3 dB)
   c. Advanced Digital Sync Processing for improved interface with LCD display devices.
   d. Active PC Audio interfacing to balanced line.
   e. Three position gain and peaking/sharpness switches
   f. Computer 15 pin HD input cable included
g. Separate buffered 15 pin VGA monitor output may be extended up to 75 feet
h. LCD scan rate indicator of horizontal & vertical frequencies
i. Automatic sync output detection
j. Outputs RGBS, RGsB or RGBHV
k. Horizontal centering control (with ON/OFF switch)
l. Automatic Sync Stripping from red, green, and blue
m. Serration Pulse Removal (dip-switch selectable)
n. Metal enclosure

4. Performance Specifications:
a. Video Input:
   • Analog male 15 pin “HD” direct input computer cable attached.
   • Horizontal Frequency range: 15-125 kHz
   • Vertical Frequency range: 30-120 Hz.
b. Video Output:
   • Analog RGB and sync, RGsB or RGBHV sync
   • Buffered female 15 pin HD monitor output.
c. Video Bandwidth:
   • Actual bandwidth (AB): 300 MHz (-3dB)
d. Audio Input
   • PC level, stereo
   • 3.5 mm stereo plug, 24” cable attached to HD-15
   • Impedance: 10 kOhms
e. Audio Output
   • Balanced Line level, stereo
   • Connector: captive screw terminals
   • Impedance: 100 ohms, balanced
5. Mechanical Specifications:
   a. Power supply US/Canada version: 100 VAC to 240 VAC, 50/60 Hz, 15 Watts, internal, auto-switchable
   b. Approvals: UL, CUL, CE, FCC Class A
   c. Dimensions: 6.35" W x 6.5" D x 1.75" H
   d. Shipping weight: US/Canada-4 lbs. (1.8 kg)
   e. Enclosure: Metal

6. The specified unit will be the Extron RGB 109xi, or equal.

7. The specified unit, or equal, will be furnished with a 10’-15’ HD15 VGA Extension Cable, for purposes of extending the distance from the HD15 jack on the exterior of the Media Cabinet to the Local Monitor.

8. Acceptable “equals” will include comparable products from other manufacturers which either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product. Note the requirement for a buffered monitor output.

D. Video/Graphics Switcher/Scaler 6dB

1. For Room 107, furnish and install one 7x1 Switcher with Built-In Video Scaler. This unit will be mounted in the equipment rack section of the Media Cabinets, and will be used to select from multiple Video, S-Video, or RGB sources to route to the Video Projector.

2. The specified product is a seven input, dual output, multi-format switcher with a built-in video scaler. The unit features system control along with RGB & video integration capabilities ideal for permanent installations using plasma displays as well as CRT, LCD, and DLP projectors.

3. This system switcher provides video scaling, which uses advanced up-conversion technologies to match the rates and resolutions of video inputs to the higher native resolution of today’s fixed matrix displays. RS-232 or IR projector & room control, universal compatibility with displays, and audio switching capabilities are also offered. To optimize image quality as well as maintain maximum image brightness and detail, video inputs
should be scaled to progressive scanning RGB resolutions that match the “sweet spot” or native resolution of the digital display being used. Using advanced digital video scaling technologies, the unit scales any video input, including any progressive signal, to one of twelve common computer-video, progressive HDTV, or plasma resolutions. RGB inputs are passed through.

4. The specified product provides a total of seven inputs. Six of the inputs are configurable for composite video, S-video, component video, or RGB. Located on the front panel, the seventh input accepts composite video, S-video, or computer-video on a 15-pin HD connector. Also, the unit is able to control and accept signals from a slaved switcher on input #1. Each input accepts audio, and audio attenuation/gain is available.

5. The specified product incorporates the following features.
   a. Universal projector control – The specified unit provides universal projector control via downloadable RS-232 or IR drivers, IR learning capabilities, or user-defined RS-232 commands.
   b. Remote IR learning capabilities – The specified unit learns and manipulates IR remote control signals. A two row, 16-character LCD guides the user through the IR learning process.
   c. Room control – Room lighting, screen settings, and other device functions may be controlled through the specified unit’s room function, via internal relays. Relays may be controlled from the front panel, furnished IR remote, RS-232 control, or optional control pads.
   d. Triple-Action Switching™ (RGB delay) – Blanks the screen when the switcher switches to a new source, eliminating visible switching transitions.
   e. Balanced/unbalanced audio – Audio gain/attenuation adjustments for each input provided. Audio breakaway available through RS-232 only.
f. Quad-standard video decoding compatibility– The specified unit uses a digital, four-line adaptive comb filter to decode NTSC 3.58, NTSC 4.43, PAL, and SECAM.

g. Inputs – The specified unit accepts any progressive YUV signal, including HDTV 480p and 720p. Six of the inputs are fully configurable for composite video, S-video, component video, or RGB. Located on the front panel, the seventh configurable input accepts composite video, S-video, or RGB on a 15-pin HD.

h. Scaled outputs – All composite video, S-video, and component video signals are scaled and output simultaneously on a 15-pin HD connector and five BNC’s. The specified unit offers industry standard computer-video output rates: 640 x 480, 800 x 600, 832 x 624, 1024 x 768, and 1280 x 1024. For plasma displays, the specified unit provides plasma output rates: 848 x 480, 852 x 480, 1280 x 768, and 1360 x 765. Also offered are HDTV 480p, 720p, and 1080p output rates.

i. Pass-through outputs – All RGB inputs are passed through and output simultaneously on a 15-pin HD connector and five BNC’s.

j. Picture controls – Horizontal & vertical shift, color, tint, brightness, contrast, detail (image sharpness), and top & bottom vertical blanking adjustments provided. Variable vertical blanking adjustments allow a user to mask noise that occasionally appears at the top and bottom of a processed image or to crop unneeded portions of an image.

k. Executive mode – Locks out all front panel functions except basic switching and control commands; however, all functions available through RS-232 control.

l. High bandwidth – 350 MHz (-3dB) video bandwidth maintains signal integrity.

m. Rack-mountable – Housed in a 2U high, one rack width enclosure. Mounting brackets included for mounting in a rack.
6. **Performance Specifications:**

a. **Video input**
   - **Number/signal type:**
     - (6) RGBHV/RGBS/RGBs/RsGsBs computer video, component video, S-video, or composite video
     - (1) RGBHV/RGBS/RGBs/RsGsBs computer video, S-video, or composite video
   - **Connectors**
     - 6 x 5 BNC female: RGB computer video, component video, S-video, or composite video
     - (1) 15-pin HD female: RGB computer video (input 7)
     - (1) 4-pin mini-DIN female: S-video (input 7)
     - (1) RCA female: Composite video (input 7)
   - **Nominal level:**
     - Analog—1.0V p-p
     - Minimum/maximum levels: Analog—0.3-2.0V p-p
   - **Impedance:** 75 ohms
   - **Horizontal frequency:** 15 kHz to 150 kHz
   - **Vertical frequency:** 30 Hz to 150 Hz
   - **Return loss:** -30dB @ 5 MHz
   - **Maximum DC offset:** 1.5V

b. **Video throughput**
   - **Gain:** Unity
   - **Bandwidth:** 350 MHz (-3dB)
   - **Frequency response:** $\pm 0.1$ dB @ 30 MHz
   - **Differential phase error:** 0.01º, 0 to 10 MHz
   - **Differential gain error:** 0.01%, 0 to 10 MHz
   - **Crosstalk:** -50dB @ 5 MHz
c. Video output
   • Number/signal type: (2) RGBHV/RGBS/RsGsBs*
     computer video (*RsGsBs will be output only if the input is RsGsBs.)
   • Connectors:
     – 1 x 5 BNC female
     – (1) 15-pin HD female
   • Nominal level: 1.0V p-p
   • Minimum/maximum levels: 0.3-2.0V p-p
   • Impedance: 75 ohms
   • Return loss: -30dB @ 5 MHz
   • DC offset: ±5mV maximum
   • Switching type: Triple action

d. Sync
   • Input type: RGBHV, RGBS, RGsB, RsGsBs
   • Output type: RGBHV, RGBS, RGsB, RsGsBs* (*RsGsBs will be output only if the input is RsGsBs.)
   • Standards:
     – TTL (RGB)
     – NTSC 3.58, NTSC 4.43, PAL and SECAM (S-video and composite video)
   • Input level: 3V to 5V p-p
   • Output level: 5V p-p
   • Input impedance: 510 ohms
   • Output impedance: 75 ohms
   • Max input voltage: 5V p-p
   • Max. propagation delay: 20 nS
   • Polarity: Positive or negative (follows input)

e. Audio input
   • Number/signal type:
- (six) stereo, balanced/unbalanced
- (one) stereo, unbalanced

• Connectors:
  - (six) 3.5 mm captive screw terminals, give pole
  - (one) 3.5 mm mini stereo jack (unbalanced), or
    (two) RCA female (white = L, red = R)

• Impedance: 12.5k ohms, balanced, DC coupled; 25k ohms, unbalanced, DC coupled

• Maximum level: +19.5dBu, (balanced or unbalanced) @
  stated %THD+N

• Input gain adjustment: -15dB to +9dB, adjustable per input
  via RS-232 or front panel

f. Audio throughput

• Gain: -15dB (min.) to +9dB (max.) adjustable in 0.5dB
  increments

• Frequency response: ±0.05dB @ 20 Hz to 20 kHz

• THD + Noise: < 0.03% @ 1 kHz at rated maximum output
  drive

• S/N: > 90dB, 21dBu output

• Adjacent input crosstalk: > 80dB @ 1 kHz

• Stereo channel separation: > 90dB @ 1 kHz

• CMRR: > 75dB @ 20 Hz to 20 kHz

g. Audio output

• Number/signal type: (one) line-level stereo,
  balanced/unbalanced

• Connectors: (one) 3.5 mm captive screw terminal, five pole

• Nominal output level: +0dBu, unbalanced

• Maximum output level: +6dBu, unbalanced

• Impedance: 50 ohms, unbalanced; 100 ohms, balanced

• Gain error: ±0.1dB channel to channel
- Drive (Hi-Z): > +21dBu, balanced or unbalanced at stated %THD+N
- Drive (600 ohm): > +15dBm, balanced or unbalanced at stated %THD+N

7. Control Specifications:
   a. Remote-Switcher
      - Serial control port: RS-232, 9-pin female D connector, dual port
      - Baud rate and protocol: 9600, 8-bit, one stop bit, no parity
      - Serial control pin configurations: 2 = TX, 3 = RX, 5 = GND,
      - Contact closure: (one) 3.5 mm, 10-pole captive screw connector
      - Contact closure pin configurations: 1 = input 1; 2 = input 2; 3 = input 3; 7 = input 7; 8, 9, 10 = GND
      - Remote keypad control: (two) 3.5mm captive screw connectors, five pole
      - Program control:
        - Control program for Windows ®
        - Standardized ASCII command set
   b. Control — room relay
      - Number/type: two momentary or latching relays
      - Connectors: (two) 3.5 mm captive screw connectors, five pole
      - Contact rating: 24V, 1 A
   c. Control — projector
      - RS-232 projector control port: (one) 3.5 mm captive screw connector, 10 pole
      - IR projector control port: (one) 3.5 mm captive screw connector, 5 pole
d. Control — peripheral equipment
   • IR Transport connector: (one) 3.5 mm captive screw connector, five pole

8. Mechanical Specifications:
   a. Power: 100VAC to 240VAC, 50/60 Hz, 60 watts, internal, auto-switchable
   b. Temperature/humidity:
      • Storage -40 to +158F (-40 to +70C) / 10% to 90%, non-condensing
      • Operating +32 to +104F (0 to +40C) / 10% to 90%, non-condensing
   c. Rack mount: Yes, with included brackets
   d. Enclosure type: Metal
   e. Enclosure dimensions: 3.5" H x 17" W x 9.5" D (2U high) (front panel is 19" wide)
   f. Shipping weight: 17 lbs (7.7 kg)
   g. Approvals: UL, CUL, CE

9. The specified unit will be the Extron System 7SC Switcher/Scaler, furnished with IR 70 Remote Control, 50’ Universal Control Cable, 9-pin male-male gender changer, Rackmount Kit, and appropriate IR Emitter (and cable) for projector control (or equal product/s by Inline or Analog Way, if suitably configured).

10. The Selected Firm will install the appropriate IR Emitter at the projector mounting location and employ the IR learning capability of the Switcher/Scaler (or downloaded IR files) to provide front-panel, wired-remote-panel and IR Remote control of selected projector functions. The Selected Firm will coordinate the selection of these functions with the Multimedia Consultant and the University’s Project Coordinator.

11. Unit will also be furnished with (one) Extron SCP 200 (White) Hard-Wired Control Pad (or equal by other manufacturer), which will be custom-mounted by the Selected Firm on the front of the Media Cabinet,
to allow access to the Switcher functions and IR port without opening the Media Cabinet doors. The Selected Firm will be responsible for all installation, mounting hardware, cable, and custom fitting or cabinet modifications to accommodate this Remote. Provisions were not made by the University for mounting this item in the Media Cabinets when they were being designed and constructed, as the product was not available at that time.

12. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.

E. Classroom VCR (one required)
1. Furnish and install one S-VHS VCR. VCR will be capable of playing both standard VHS tapes and S-VHS tapes. Units will be mounted in the equipment rack section of the Media Cabinets.
2. The product specified incorporates the following features.
   a. Unit will output S-VHS, regardless of source tape format.
   b. Unit must be capable of RS-232 serial remote control for potential future use.
   c. Unit will include a “shuttle/jog” wheel for ease of tape handling and searching.
3. The specified unit will be the JVC SR-S365U, or equal (or current model).
4. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.

F. Classroom Visual Presenter 6dB
1. Furnish, test and demonstrate one High-Resolution Visual Presenter, with all necessary cables, for classroom use. University will furnish cart and security device, as necessary.

2. The product specified incorporates the following features:
   a. True XGA resolution plus NTSC/PAL video output
   b. 1/3" 850,000 (1,077 x 788) pixels Progressive-scan CCD
   c. Analog RGB (XGA-75Hz) output
   d. Converts the external analog RGB input into video output
   e. 15fps image transfer
   f. High-quality 10x optical zoom
   g. Auto focus
   h. Wireless remote control

3. Performance Specifications:
   a. Input/Output
      - Input selection: 3 modes (Internal/RGB1/RGB2)
      - RGB input: Mini DSUB 15 pin connector female
      - RGB output: Mini DSUB 15 pin connector female
      - C-Video output: RCA Pin jack
      - S-Video output: Mini DIN 4-pin connector
   b. Lighting
      - Upper lighting unit: Built-in, 6W fluorescent lamp x2
      - Baselight: Built-in
   c. Optics
      - Lens: 10x (f=5.8 ~ 58mm) F2.8
      - Shooting area: Max 13.8” x 10.2”
      - Zooming: Powered (with double speed function)
      - Focusing: Auto/Manual
      - Iris: Auto (with level adjustment)/Manual
   d. Other
      - RS-232C control terminal: DSUB 9P
• DC output DC 12 V (Max 0.9A)

e.  Picture
• Image pick-up element: 1/3” progressive scan CCD
• Total picture element: 1,077(H) x 788(V)
• Effective picture element: 1,024(H) x 768(V)
• Sync System: Internal
• Horizontal resolution:
  – More than 600 TV lines (RGB output)
  – More than 400 TV lines (Video output)
• Analog RGB output: XGA (1,024 x 768@75Hz), VESA
• C-video output: NTSC/PAL compatible
• S-Video output: NTSC/Pal compatible
• White balance: Full-auto
• Gamma selection: Built-in (1.0/0.6)
• Video output selection: Built-in (NTSC/PAL)
• Flicker correction: Built-in (60/50Hz switch selection)
• Shooting speed: 15 frames/sec.

4.  Mechanical Specifications
a.  Carrying handle: Built-in
b.  Dimensions:
  • Set-up: 27.6 x 21.3 x 24.6 in
  • Folded: 15.7 x 26.0 x 6.6 in
c.  Weight: 22 lbs
d.  Power source: AC, 120V, 60Hz
e.  Power consumption: 40W

5.  The specified unit will be the Elmo HV-5000XG, or equal. Note that “equal” products must have a minimum of 1024x768 graphics output resolution and a “frame rate” of no less than 15 fps.
6. The unit will be furnished with a suitable 15’ VGA Cable, for connection to the separate Computer Interface Panel or the front-panel RGB input of the Switcher/Scaler.

7. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.

G. Classroom Broadband Cable Tuner 6dB

1. Furnish and install one Broadband Cable AM/FM/TV/Weather Radio Tuner, for connection to the Video Switcher/Scaler as a signal source. The University will provide the Broadband Cable feed.

2. The specified unit is a control-network-optimized high-performance AM/FM/TV and Weather Radio tuner. The control-network system can store virtually unlimited radio station and television (TV) channel presets. The presets are available for recall through remote-keypads, remote control devices, and/or touchpanels. The frequency of the radio station or TV channel being received is displayed on the specified unit and can also be displayed on a suitable touchpanel. The specified unit also receives monophonic (mono) AM broadcasts, stereo or mono FM and mono Weather Radio broadcasts. The TV band provides reception of channels 1 to 125. The video may be connected to video inputs, switching devices and/or to any commercial TVs or monitors that have composite video input connectors.

3. The specified unit will be fully operable from front-panel controls, without the need for a remote-control system.

4. Performance Specifications:
   a. AM Tuner Specifications
      • Sensitivity: 55µV
      • Alternate Channel Selectivity: 55dB
      • Image Rejection: 35dB
• IF Rejection: 60dB
• Output Level, Line @ 10k ohms AM/FM: 1VRMS

b. FM Tuner Specifications
• Input Connector (“F” Type Coaxial): 75 ohms
• Usable Sensitivity, Mono: 11 (dBf)
• Signal to Noise Radio@65 dBf, mono/stereo:
  • 74dB/70dB
• Selectivity, Adjacent / Alternate Channel:
  • 5dB/65dB
• IF Rejection: 100dB
• AM Rejection: 55dB
• Stereo Separation: 45dB
• THD @ 1KHz mono/stereo (%): 0.05

c. Radio Data Systems (RDS)
• Purely Digital RDS, FM encoded
• Data available to control system

d. TV Tuner Specifications
• Input Connector: (“F” Type Coaxial): 75 ohms
• Frequency Range: 55 to 802MHz
• Off air TV Channels: 2 to 69
• CATV Cable Channels: 2 to 125
• Stereo Separation: 35dB
• THD @ 1Khz L+R (%): 0.2
• Sensitivity: –20 to +20dBmV
• Video Level @ 75 ohms: 1VRMS
• Output Level, Line @ 10k ohms: 1VRMS
• SAP: Secondary Audio Program

e. NOAA Radio Specifications
• Input Connector: (TV “F” Type Coaxial): 75 ohms
• Frequency: 162MHz
• THD @1KHz L+R (%): 0.2
• Sensitivity (mono only): -20 to +20 dBmV
• Output Level, Line @ 10k ohms: 1VRMS

5. Mechanical Specifications:
   a. Indicators
      • PWR: Indicates power supplied to the unit
      • NET: Indicates communications between the system and specified unit
      • SIG: Display indicates strength of incoming signal
      • MONO: Indicates that mono output is activated in FM band
      • SAP: Indicates that secondary audio program selector is activated
      • PRE: Indicates that manual preset mode is activated
      • TUNE: Indicates that manual tuning mode is activated
      • SRCH: Indicates that manual search mode is activated
      • AM: Indicates unit is set for AM reception
      • FM: Indicates unit is set for FM reception
      • WX: Indicates unit is set for weather radio reception
      • TV: Indicates unit is set for TV reception
   b. Buttons
      • TUNING: Tunes signal up or down
      • BAND: Selects either AM, FM, weather radio, or TV
      • MONO: Selects mono output in FM band
      • MODE: Selects either local preset, manual tuning, or search mode
   c. Connectors
      • 12VDC .5A: Power socket connector used to supply power via an external AC power pack
• NET: (two) 6-position RJ11 modular jacks are pass-through connectors that are also used to connect the unit to the control system
• AUDIO (L+R): (1) RCA jack pair; audio outputs
• VIDEO: RCA jack; video output
• AM: 2-position connector; connects to AM antenna
• FM: F coaxial cable; connects to FM antenna
• TV: F coaxial cable; connects to TV antenna
d. Power Requirements: 24VDC, 170 mA; network power
e. Dimensions: 1.70"/4.23cm (H) x 7.07"/17.95cm (W) x 6.32"/16.06cm (D)
f. Weight: 2.3lbs./1.05kg

6. The specified unit will be the Crestron ST-TUNE, or equal. The unit will be connected to the specified Multimedia Controller, for remote monitoring or operation, as required. Units not capable of interfacing to the Multimedia Controller, with complete control and monitoring functionality, will not be acceptable.

7. The unit will be furnished with suitable “cable” or “wire”-style antennas for AM and FM reception. These antennas will be of basic design, with no special gain circuitry, and will be mounted to the interior of the Media Cabinets, as appropriate. High-performance is neither requested nor required.

8. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.

III. Video Wire and Cable

A. Video wiring, RGB, NTSC, S-VHS, or other, will be run using specifically designed High-Resolution Cables. The use of multi-core cables is encouraged
wherever practical. For this project, the use of Plenum-Rated cable is required.

Suggested cable manufacturers will include Extron, Inline, and Covid. Other manufacturers products will be acceptable if they meet the performance criteria of “High-Resolution Coax Cables,” as exemplified by the products from the manufacturers noted herein.

B. All conduits used by the Selected Firm will be left with a pull-string installed.

C. All cable “home runs” must be continuous, with no splices.

IV. Video System Installation

A. General

1. Video System Installation will comply with all provisions of Attachment 3a, Sound Systems, Section VIII, Sound System Installation, Sections A, B, and C, substituting “video” for “sound” where applicable.

2. Wherever possible, within the scope of the hardware proposed, if a choice exists between using the S-Video or Composite Video outputs of a signal device, preference will be given to S-Video.

3. All video signal lines will be properly terminated, as required by the equipment involved.

4. The Selected Firm must furnish all portable cables required for full and complete operation of systems.

5. The Selected Firm will label all devices, panels, jacks, and controls as to their functionality. Labels will be internal (insert labels for buttons, and similar), directly engraved, silk-screened, or engraved on Lamacoid-type permanent-adhesive labels. The Selected Firm will coordinate the labeling, choice of names or icons, and placement with the Multimedia Consultant and the Project Coordinator for ITC. No labels will be applied or finalized without signed approval by the University’s Project Coordinator, or their designated representative. It is the desire of the
University to keep the naming or identification of devices, jacks, and controls as intuitive and simple as possible.

The use of “tape” style labels will not be acceptable for this project.

V. Proof-of-Performance and Testing

A. For Items “B,” “C,” and “D” that follow, the Selected Firm will be responsible for performing all of the required tests, on all of the equipment in the systems.

B. The Selected Firm will, in the presence of the Multimedia Consultant, University’s agent and/or any designated representatives of University, demonstrate all items of the video systems herein specified, showing them to be fully functional and capable of performing the tasks required. A checklist will be completed and initialized by University and the Multimedia Consultant certifying acceptance or rejection of performance, for each item.

C. Proper signal levels from all designated or furnished signal sources will be verified using suitable Test Equipment and/or test source material. The Selected Firm will furnish all test equipment and/or test signal sources required. Test Signals covering the entire spectrum of expected usage (resolutions, scan rates, etc.) will be sent to the Video Projector to verify proper operation, registration and color setup. A checklist will be completed and initialized by University and the Multimedia Consultant certifying acceptance or rejection of performance, for each item, with each signal type.

D. All tests will be performed in the presence of the Multimedia Consultant and University’s agent, or designated representatives of University. Any equipment that does not meet specified performance criteria will be corrected or adjusted on-site if possible to establish compliance. Equipment that cannot be made to perform according to specification will be removed and replaced by the Selected Firm at no additional charge to University.
Attachment 4c
Audio-Visual Equipment

I. Scope

A. Description
1. This section includes all Audio-Visual Equipment, not otherwise specified in Attachments 4a and 4b. Included in this section will be a Projection Screen, a Wireless Keyboard for use with University-furnished computers, a Standard Overhead Projector, System Remote AC Turn-On & Surge Suppressor, and a Wireless Mouse w/Y-Mouse Adapter as noted in the specifications and on the Drawings.
2. Peripheral Equipment and Accessories, as noted in the specifications and on the Drawings.
3. The Selected Firm is responsible for furnishing fully operational systems to University on completion of this project. Items not specifically listed in this section, but required for proper operation of the systems herein described, will be the responsibility of the Selected Firm to provide as part of the package.

B. Performance Criteria
The Audio-Visual Equipment herein specified is a basic guideline, indicating minimum required functionality and performance criteria. Firms must satisfy the fit, form, and function of the basic designs, but may present viable alternative approaches as their primary bid. Such presentations must be accompanied by a complete proposed Bill of Materials (all major items), and System Risers and/or line drawings indicating system connectivity, and verification that all basic design criteria are being satisfied.

C. Work By Others
Certain provisions have been made for conduit, junction boxes, furniture cutouts, and AC power in the existing General Construction Contract. It will be the
responsibility of all firms to review these provisions thoroughly. Any additional work, either conduit, cutting, patching, etc. necessary to install the firm’s proposed system, and return an area to it’s current finished state, will be the sole responsibility of the firm, and will be included in their price.

II. Standard Classroom Audio-Visual Equipment

A. Projection Screens 6dB

1. Furnish and install one Wall-mounted Manual Projection Screen. Screens will nominally be wall-mounted, as high as possible. Final mounting will be as approved by Multimedia Consultant and University Architect.

2. The product specified incorporates the following features.
   a. Screen will be furnished in AV Format. The specified unit will include a viewing area of 96” H. x 120” W. (Note: The Multimedia Consultant and the University are aware that under normal use there “may” be a white border on either side of the projected image. The screen size specified is to allow for ease in accommodating the future HDTV screen format.)
   b. Case of 22 ga. steel, flat back design, with embossed, baked-on Plastisol finish in gray (standard) or white (optional).
   c. 16 ga. endcaps finished to match case, with integral roller brackets, concealing roller ends. Furnished with matching universal mounting brackets.
   d. Viewing surface of Matte-White fabric (or equal), mounted to one-piece rigid steel roller with FabrikLok spline/groove construction to prevent separation of fabric from roller. Viewing surface flame and mildew resistant. Bottom of viewing surface securely mounted on tubular steel slat, with ends protected by vinyl caps.

3. The specified unit will be a Draper Model Luma 2, AV Format (96” x 120”), with Matte-White viewing surface, and will include all necessary mounting hardware.
4. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product. Alternate manufacturers “may” include Stewart and DaLite, providing the above requirements are met.

B. Wireless Keyboards 6dB

1. Furnish one Wireless Computer Keyboard, to be used with University-furnished computers. Furnish one Apple Macintosh Adapter with each Keyboard package.

2. The product specified incorporates the following features.
   a. Communication Radio frequency technology
   b. 50 foot operating range
   c. 4 switch-selectable channels for multi-unit installations
   d. 49mHz frequency
   e. Keyboard Durable and compact with 83 full-size keys
   f. Embedded numeric keypad for 101 key compatibility
   g. 100 hours operation (nominal) on 4 AA alkaline batteries (included)
   h. Works with standard AT keyboard driver
   i. Keyboard dimensions 17.3 x 6.3 inches
   j. Mouse Touchpad Fingertip-controlled movement and clicking
   k. Left and right mouse buttons
   l. Works with standard mouse drivers
   m. Receiver Integral 5 foot cable with keyboard and mouse connectors
   n. 5-pin keyboard and 9-pin serial adapters
   o. Game port cable
   p. Receiver dimensions 4.6 by 6.3 inches

3. The specified unit will be the Wireless Surfboard, as manufactured by Wireless Computing, Inc., with the Apple Macintosh Adapter included.
4. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.

C. Wireless Mouse w/ Y-Mouse Keyboard/Mouse Adapter
   1. Furnish one Wireless Mouse System with Y-Mouse Keyboard/Mouse Adapter, to be used with University-furnished computers.
   2. The Wireless Mouse will use the existing mouse driver - Microsoft, Logitech, Apple Macintosh, or Power PC.
   3. The Y-Mouse product will be for PC use, not Apple. This unit will allow the wireless keyboard and the wireless mouse to share a common laptop or desktop PS/2 port.
   4. The wireless mouse product specified incorporates the following features:
      a. Wireless design
      b. Revolutionary gyroscopes
      c. Natural gestural control
      d. RF multi-channel radio
      e. No software drivers required
      f. PC, PS/2 and Mac
      g. Two AA batteries
   5. The specified unit will be the GyroPoint Pro II, as manufactured by ixmicro, Inc. and the Y-Mouse product will be the Keyboard/Mouse Adapter, as manufactured by P.I. Engineering, Inc.
   6. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.
D. Remote AC Turn-On System & Surge Suppressor (one each required)

1. Furnish and install one Remote AC Turn-On System (custom or pre-manufactured), to be mounted internal to the Media Cabinets, with an external On/Off control and power indicator. Furnish one Series-Mode Surge Suppressor for internal use in the Media Cabinet. These systems will power on or off equipment in the Media Cabinet, and protect sensitive electronics from power transients, as determined in consultation with ITC and the Multimedia Consultant.

2. Equipment will be powered up and down in a manner that does not introduce loud transients or damaging spikes in any of the equipment.

3. The Selected Firm will provide all internal AC wiring strips or outlet devices (UL or approved testing lab certification required), as required by the equipment complement furnished. The University will provide the 120 VAC circuits internal to the Media Cabinet, as 20 A. duplex receptacles, for use by the Selected Firm.

4. The specified Series-Mode Surge Suppressor will be the Surge-X Model SX20-iR2, or alternate choice from the Surge-X product line. The Remote AC Turn-On System may be combined with the Surge Suppressor through the use of the Surge-X SX2120-SEQ, at the discretion of the Selected Firm. The use of Shunt-Mode Surge Suppressors will not be acceptable.

E. Standard Overhead Projector

1. Furnish one Standard Overhead Projector with lamp-changer. University will furnish cart and security device.

2. The product specified incorporates the following features:
   a. Approx. 1700 Lumen output, or greater
   b. 10.5” x 10.5” stage
   c. Lamp Changer feature
   d. Variable-focus lens, 12.2”-14.2”
      Note: Long-throw capability (14” focal-length or greater, required)
   e. All-metal design.
3. The specified unit will be an Eiki Model 3890 Stationary Overhead Projector (or current model, if applicable), or equal.

4. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product. Alternate manufacturers “may” include Buhl, Dukane, Elmo, or 3M, providing the above requirements are met.

III. Audio-Visual Equipment Installation

A. General

1. The Selected Firm will be responsible for installation of the Projection Screens in all classrooms. Multimedia Consultant and Architect will approve exact location, mounting method, and mounting height prior to final installation. Locations are as shown on the University’s General Contract drawings.

2. The Wireless Keyboard, Wireless Mouse, Y-Mouse Adapter and Overhead Projector are “furnish-only” items, and will be delivered to the designated ITC representative. They will, however, be subject to the “Proof-Of-Performance” testing, as noted below.

3. The Selected Firm will label all devices, panels, jacks, and controls as to their functionality. Labels will be internal (insert labels for buttons, and similar), directly engraved, silk-screened, or engraved on Lamacoid-type permanent-adhesive labels. The Selected Firm will coordinate the labeling, choice of names or icons, and placement with the Multimedia Consultant and the Project Coordinator for ITC. No labels will be applied or finalized without signed approval by the University’s Project Coordinator, or their designated representative. It is the desire of the University to keep the naming or identification of devices, jacks, and controls as intuitive and simple as possible.
The use of “tape” style labels will not be acceptable for this project.

IV. Proof-of-Performance and Testing

A. For Items “B,” “C” and “D” that follow, the Selected Firm will be responsible for performing all of the required tests, on all of the equipment furnished.

B. The Selected Firm will, in the presence of the Multimedia Consultant, University’s agent and/or any designated representatives of University, demonstrate all equipment items herein specified, showing them to be fully functional and capable of performing the tasks required. A checklist will be completed and initialized by University and the Multimedia Consultant certifying acceptance or rejection of performance, for each item.

C. All tests will be performed in the presence of the Multimedia Consultant and University’s agent, or designated representatives of University. Any equipment that does not meet specified performance criteria will be corrected or adjusted on-site if possible to establish compliance. Equipment that cannot be made to perform according to specification will be removed and replaced by the Selected Firm at no additional charge to University.

D. The Wireless Keyboard, Wireless Mouse, and Y-Mouse Adapter are “as requested by the University ITC staff.” Units will be shown to be operational, but compatibility with University-furnished computers will be the responsibility of ITC, and not the Selected Firm.
Attachment 4d
Multimedia Control Systems

I. Scope

A. Description

1. This section includes all Multimedia Control Systems equipment. Included in this section will be a System Controller, Ethernet interface (where specified), Control Panels (where specified), and Interface Units or Modules (as required) in the quantities as noted in the specifications and on the Drawings.

2. It is the intent of this section to provide LAN or WAN (or Internet, if selected at some point in the future) access to key elements of the Sound, Video, and Audio-Visual Systems described elsewhere in this document. Such access will include remote control (for operational or Help Desk applications), system diagnostics (if applicable) and preventive maintenance information. TCP/IP will be used as the communications protocol across the network, and standard Web Browsers will be the means of accessing the GUI (Graphic User Interface).

3. Peripheral Equipment and Accessories, as noted in the specifications and on the Drawings.

4. The Selected Firm is responsible for furnishing fully operational systems to University on completion of this project. Items not specifically listed in this section, but required for proper operation of the systems herein described, will be the responsibility of the Selected Firm to provide as part of the package.

B. Performance Criteria

The Multimedia Control Systems herein specified are basic guidelines, indicating minimum required functionality and performance criteria. Firms must satisfy the fit, form, and function of the basic designs, but may present viable alternative approaches as their primary bid. Such presentations must be accompanied by a
complete proposed Bill of Materials (all major items), and System Risers and/or line drawings indicating system connectivity, and verification that all basic design criteria are being satisfied.

The means of implementing the “TCP/IP-based Network Control” portion of this section will be considered of primary importance - not only in terms of the ease and capabilities of the system implementation and operation, but also in terms of the robustness, flexibility, and expandability of the proposed methodology and hardware - as it may form the core of a new “support mechanism” employed by ITC. Consideration will be given to additional “support documentation” which may be included by firms submitting proposals, that may include written references for the proposed system, suggested long-range plans of development, or any other additional information the firm may wish to submit to the University in this regard.

C. Work By Others

Certain provisions have been made for conduit, junction boxes, furniture cutouts, and AC power in the existing University Renovation Work. It will be the responsibility of all firms to review these provisions thoroughly. Of specific note should be that the various wall and cabinet-mounted junction boxes and conduit runs are being furnished and installed by the University, and are as noted on those drawings and specifications. Any additional work, either conduit, cutting, patching, etc. necessary to install the firm’s proposed system, and return an area to it’s current finished state, will be the sole responsibility of the firm, and will be included in their price.

II. Multimedia Control System Equipment

A. Integrated Controller (one required)

1. Furnish and install one Integrated Multimedia Controller. This unit will be mounted in the equipment rack section of the Media Cabinets, and will
be used to access, monitor, and/or control other designated hardware in the
rack or classroom.

2. The specified product will be a high performance, integrated control
system with dynamic expansion capabilities.

3. An LCD control center and LED indicators will provide access to virtually
all system functions - without using a PC. System status, COM port status
and card slot functions will all monitored from the front panel.

4. DPA (Direct Processor Access) (or as furnished by the proposed product)
will provide a direct link to any LAN or Internet connection via Ethernet.
The DPA card slot (or as furnished by the proposed product) will
accommodate 10BaseT, 100BaseT and future communication protocols
like ATM and Firewire. Each control system will have its own user-
assigned IP address, seamlessly integrating with a computer network.

5. The specified product incorporates the following features.
   a. Utilize a real time, event driven, multi-tasking, multi-threaded
      operating system with a distributed processing architecture.
   b. Support internal high-speed data communications port with Direct
      Processor Access (DPA) (or as furnished by the proposed product).
   c. Support 10BaseT Ethernet communications with DPA
      communication and future 100BaseT Ethernet, ATM, Firewire
      communications.
   d. Support TCP/IP and SNMP communications with Direct Processor
      Access (or as furnished by the proposed product) (communication
      through control system bus link will not be accepted).
   e. Support user assigned IP address.
   f. 100% compatible with all PC, Mac, Unix, etc LANs.
   g. Full API (Applications Interface) directly to control system via
      TCP/IP for integration with Visual Basic, C++, Java, etc.
      applications. API support through included ActiveX module
      and/or Dynamic Link Library (.DLL).
h. 2 line by 40-character front panel LCD communication center (or as furnished by the proposed product). Display will provide the following information without the use of a computer:
   - View control program (name, date, creator).
   - Manually control any function (I/O, relays, etc).
   - Report network devices.
   - Report error messages.
   - User definable functions – program LCD menu with dealer name, telephone number, control functions (use like a touch panel).

i. Front panel LED display panel for status indication of every port and card slot.

j. Network Analyzer to continuously monitor the integrity of the network for wiring faults, marginal communication performance, and network errors – all information is viewable.

k. Integrated three-slot card cage to support any mix of control cards for IR, RS-232/422/485, relay, digital I/O, analog input, volume, MIDI.

l. Internal power supply.

m. Front and rear programming ports.

n. Support RS-485 token passing local area network (LAN) with data communication for a minimum distance of 5000 feet.

o. Support a minimum of 253 LAN devices simultaneously.

p. Control system will support object-oriented logic based programming language or a C-like language programming language or both. If available, both programming types are to be supported to run simultaneously and integral to each other.

q. Control system manufacture will supply Windows-based graphical programming software for drag and drop object oriented programming for the control system operation.
r. Control system manufacture will provide Windows-based graphical programming software, which is self-documenting in that it generates a symbolic flow diagram printout from the system program.

6. Functional / Mechanical Specifications:
   a. Connectors (or as furnished by the proposed product)
      • NET: (one) 6-wire RJ-type connector and (one) 4-pin male connector; for expansion to network peripherals; 50W maximum load depending on expansion slot load
      • RELAYS: Furnishes (eight) normally open, isolated relays; each relay is rated 1A, 30VAC/DC; MOV arc suppression across contacts for use with “real world” loads
      • INPUT/OUPUT: Furnishes (eight) programmable analog inputs and digital inputs/outputs; digital outputs offer 250mA sync from maximum 24VDC; catch diodes for use with “real world” loads; digital inputs rated for 0-24 VDC, 20K ohms input impedance, logic threshold 1.25VDC; analog inputs rated 0-10VDC, protected to 24VDC maximum, 20K ohms input impedance; programmable 2K ohms pullup resistor (per pin, software reference to GND or closure to GND)
      • IR/SERIAL: Furnishes (eight) serial outputs for (IR), RS-232 or serial interface; signal (S) and ground (G) pins; infrared output up to 1.2MHz
      • COM: Furnishes (six) bidirectional serial ports for RS-232, RS-422 or RS-485 communication with hardware and software handshaking; speeds up to 230,400 bps
      • COMPUTER: (two) one per front and rear panel, 9-pin DB9 female connector for programming with a PC; modem compatible; not included
• Expansion Slots
  – DPA: Direct Processor Access expansion slot for optional local area network (LAN) interface card (or as provided for by proposed product); supports 10BaseT Ethernet card; may require field installation and has (one) 8-wire RJ45 connector for communication access
  – Other (1-3): (three) open “card cage” slots accept any network-interfaceable control cards

b. Indicators (or as furnished by the proposed product)
  • PWR: Indicates power supplied to the unit
  • NET: Indicates activity within the system
  • ERR: Indicates an error message is available from the software feature buttons
  • TXD (Ethernet): Indicates transmission of Ethernet data
  • RXD (Ethernet): Indicates reception of Ethernet data
  • LNK (Ethernet): Indicates attachment to Ethernet network
  • ERR (Ethernet): Indicates Ethernet protocol error
  • COM TX (A-F): Indicates transmission of data to serial devices attached to respective COM ports
  • COM RX (A-F): Indicates reception of data from serial devices attached to respective COM ports
  • COM RTS (A-F): Indicates when unit is ready to receive data from serial devices attached to respective COM ports
  • COM CTS (A-F): Indicates when serial device on the respective COM port is ready to accept data from the unit
  • IR-SERIAL (A-H): Indicates activity on respective IR/SERIAL line
  • INPUT-OUTPUT (1-8): Indicates input voltage threshold for respective I/O port exceeded
• RELAY (1-8): Indicates respective relay is closed
• SLOT (1-3): Illuminates when card is inserted into slot; flashes when card is active
c. Fully programmable front panel "soft key" buttons (or as furnished by the proposed product)
d. Reset Buttons (or as furnished by the proposed product)
  • HW-R: Permits physical reset of system
  • SW-R: Restarts control program
e. Screen (or as furnished by the proposed product)
  • (1) Reverse mode (yellow and black) LCD back light; (2) lines (or as furnished by the proposed product)
  • (40) Characters per line (or as furnished by the proposed product)
f. Menu Function Buttons (or as furnished by the proposed product)
  • PANEL: Programmable interface offering command text, indirect text, and hierarchical screen structure
  • INFO: Displays system information including the loaded control program
  • MSG: Displays system alarms and error messages
  • TIME: Permits alterations to system date and time; access code required
  • COM: Monitors the transmission and reception traffic on each COM port
g. Menu Selection Buttons (or as furnished by the proposed product)
  • MENU: Returns screen display to menu default state
  • ^: Advances the current screen display
  • V: Returns the current screen display to its previous state
  • BKLT: Alters screen and LCD brightness
h. Power Requirements (or as required by the proposed product)
• 100-250VAC, 2.3A, 50/60Hz, internal universal power supply

i. Dimensions (or as defined by the proposed product)
• 3.47” / 8.81cm (H) x 19.00” / 48.26cm (W) x 8.43” / 21.41cm (D)

j. Weight (or as defined by the proposed product)
• 7.01lbs / 3.18kg

7. Additional Performance Specifications

a. The control system will support a variety of wireless communication modes, including one-way and two-way radio frequency and infrared transmission.

b. The control system will not require internal switch settings, jumpers, or adjustments. All circuit boards and modules must be directly replaceable without the need for pre-placement setup. Hardware parameters will be set and defined by software parameters in the system program. Circuit boards and modules requiring switch settings, jumper settings, or adjustments will not be accepted.

c. User connections to the control system will be clearly labeled as to function (relay, analog, volume controls, etc.), as well as information on connections such as +, -, and G. Array of numbers or letters that do not convey specific information will not be accepted.

d. The control system will support expansion enclosures or card cages, which may be located anywhere on the system network.

e. The control system manufacture will be capable of providing slide projector, motor control, power control, light dimming, RS-232, infrared, pan/tilt, camera lens, analog inputs, digital inputs, and digital output interfaces that operate directly from the network.

f. The control system will use centralized software. Information required to interface with the various controlled equipment will be
stored in the control systems central processing computer and downloaded to the appropriate control hardware. Control systems requiring EPROM changes or special factory programming are not accepted.

g. The control system manufacture will provide programming diagnostic software that indicates the program flow in real time as the system is being operated. This software will permit the isolation of specific program events for analysis.

h. The control system manufacture will provide end-user software based on menus and windows, which permit programming and editing of multiple real-time sequences. The control system includes a virtual tape recorder, which stores system functions in non-volatile memory. Sequences of functions are automatically recorded as they occur and may be played back causing functions to be activated in the same time sequence as they occurred. Sequences may be edited in non-real time and then played back.

i. The control system manufacture will provide end-user software for event scheduling. Functions or sequences of functions may be programmed to occur based on calendar dates, weekly, or monthly cycles.

j. The control system will include indicators, which signify system errors, power supply failure, and overload.

8. The specified unit will be the Crestron CNMSX-PRO, or equal.

9. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.

B. Ethernet Card for Integrated Controller (one required)

1. Furnish and install one 10Base-T Ethernet Card in the Integrated Multimedia Controller, for connection to the University LAN/WAN. The
University will furnish data port or cable (RJ-45) connected to the University network, for use by the Selected Firm.

2. The specified product incorporates the following features.
   a. The Ethernet Card provides communication via LAN/WAN or Ethernet to any network control device via industry standard Internet Protocol. The Ethernet Card allows remote diagnostics and upgrades and access to the control system’s network analyzer, as well as the opening of TCP/IP sockets to communicate with other Ethernet-based systems, and the ability to activate any device connected to the system.
   b. The specified Ethernet Card is upgradeable in the field and connects directly to the Direct Processor Access (DPA) slot (or as provided by the proposed product) to provide direct, high-speed access from any controlled system device to the system processor.
   c. The specified Ethernet Card also contains a 2MB file system that is used as a Web Server. The Selected Firm (or the University - post Warranty) will use the manufacturer’s Control Panel/HTML software, or most any third-party HTML package (Microsoft® FrontPage™, Adobe® PageMill™, etc.) to create Java powered HTML pages. These pages can be stored onboard the Ethernet Card Web Server. Then, up to five users can simultaneously connect directly to the control system via most popular web browsers.
   d. The specified Ethernet Card eliminates the need for a dedicated PC or software licensing, and hosts the graphical user interface securely inside the card. Moreover, all memory resources are maintained within the control system, resulting in no additional network overhead.
   e. The specified Ethernet Card will support the following communications protocols:
      - TCP/IP communications
• UDP/IP communications
• Telnet communications
• 10BaseT Ethernet interfaces

f. The Ethernet Card will incorporate an On-board RISC processor, to minimize processing overhead in the Integrated Controller.
g. The Ethernet Card will incorporate built-in security, as well as being able to take full advantage of any LAN-based security systems as implemented by the University.

3. Proposed Ethernet Card Systems that do not incorporate an integral Web Server capability, will require that the Multimedia Control System be furnished with any additional external hardware or licensing required to duplicate such features or capabilities, at no additional cost to the University. The use of Client-Side systems, and Distributed Architecture is recommended, but consideration will be given to all proposed systems, if suitably presented and documented.

4. The specified unit will be the Crestron CNX-ENET+, or equal.

5. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.

C. Connection to External Devices

1. The Multimedia Control System will communicate directly over its own internal network to any other Control Panels, Interface Units or Modules, as may be specified elsewhere in this document as required to be connected to the Multimedia Controller.

2. The Selected Firm will be responsible for any cables, interfaces, or additional hardware to make any and all connections to such external devices, even if not specifically described or defined in this document.
D. GUI (Graphic User Interface) and System Programming

1. The Selected Firm will be responsible for developing all Controller, Control Panel, Network, and Web Browser software code, as may be required for a full implementation of the system capabilities, as noted in this section.

2. The Selected Firm will develop the Graphical Interface Pages for Local Control Panels (if applicable), the Web Browser HTML access, or both (if applicable). If both methods of Graphical Interface are used, the Web-based HTML pages will mirror the appearance, functions, controls, and feedback of the Local Control Panels.

3. For all classrooms employing the Integrated Multimedia Controller, the Selected Firm will also mirror all control capability and functionality (less graphic displays) to the integral LCD Panel and “soft keys” on the front panel of the Controller.

4. For Campbell 107, there will NOT be a Local Control Panel, other than the integral LCD Panel on the face of the Integrated Controller. Remote Control access will nominally be via Web Browser and the University LAN/WAN.

5. For Campbell 107, the Integrated Multimedia Controller will provide control and diagnostic (if applicable) access to the functions of the specified Broadband Cable Tuner, the Video Switcher/Scaler and the Video Projector, using the RS-232 or network control capability of these devices. The Selected Firm will be responsible for providing all control cables, connectors, or interfaces which may be required to fully accomplish this task, whether directly specified in this document or not.

6. For Campbell 107, the Selected Firm will develop the HTML Control Pages in such a manner as to match the general appearance and functionality of the Control Pages that are to be developed for other classrooms that have a Local Control Panel. This general appearance will be carried throughout all of the classroom projects employing HTML Control.
7. The HTML Control Pages will be uploaded to the Local Web Server located on the Ethernet Card in the Integrated Multimedia Controller. The Selected Firm will coordinate the assignment of static IP addresses with the University’s ITC Department.

8. The Selected Firm will present a Preliminary Layout and Design of the Control Pages and the proposed Functionality of the Multimedia Control System prior to finalizing the programming and design. The Multimedia Consultant and representatives of the University’s ITC staff will review this Preliminary Layout and Design and make any recommendations or suggested changes as they may feel are required. The Selected Firm will not finalize the development of the Programming, Graphic Interfaces and the Control Functionality until their Preliminary Layout and Design has been Approved and Signed by the University’s Project Coordinator, or their authorized representative.

III. Multimedia Control Systems Equipment Installation

A. The Selected Firm will be responsible for installation of the Multimedia Control System in the classroom/s. The Multimedia Consultant and Architect will approve exact locations, mounting methods, or other design criteria prior to final installation, unless already specified in this section. Locations (if applicable) are as shown on the University’s General Contract drawings.

B. The Selected Firm will label all devices, panels, jacks, and controls as to their functionality. Labels will be internal (insert labels for buttons, and similar), directly engraved, silk-screened, or engraved on Lamacoid-type permanent-adhesive labels. The Selected Firm will coordinate the labeling, choice of names or icons, and placement with the Multimedia Consultant and the Project Coordinator for ITC. No labels will be applied or finalized without signed approval by the University’s Project Coordinator, or their designated representative. It is the desire of the University to keep the naming or
identification of devices, jacks, and controls as intuitive and simple as possible.

The use of “tape” style labels will not be acceptable for this project.

IV. Proof-of-Performance and Testing

A. For Items “B,” and “C” that follow, the Selected Firm will be responsible for performing operational tests, on all of the equipment furnished.

B. The Selected Firm will, in the presence of the Multimedia Consultant, University’s agent and/or any designated representatives of University, demonstrate all equipment items herein specified, showing them to be fully functional and capable of performing the tasks required. A checklist will be completed and initialized by University and the Multimedia Consultant certifying acceptance or rejection of performance, for each item.

C. All tests will be performed in the presence of the Multimedia Consultant and University’s agent, or designated representatives of University. Any equipment that does not meet specified performance criteria will be corrected or adjusted on-site if possible to establish compliance. Equipment that cannot be made to perform according to specification will be removed and replaced by the Selected Firm at no additional charge to University.
Attachment 4e
System Training and Documentation

I. Training

A. The Selected Firm will provide a minimum of 12 hours of on-site training for each Classroom on all of the systems furnished within the scope of this Contract. Allocation of these hours into time “blocks” will be at the discretion of the University.

B. The Selected Firm will allow the University to videotape any of the training sessions, if they so desire.

II. Documentation

A. The Selected Firm will turn over five complete sets of “As-Built” Drawings to the University upon final acceptance of the installation, for each Classroom, as noted above. “As-Built” drawings must include all System Risers, Panel Drawings and Rack Layouts for all systems included in the classrooms. One additional set will be turned over to the Multimedia Consultant.

B. The Selected Firm will turn over five complete sets of all Manuals, Cut Sheets, and Service Documents to the University upon final acceptance of installation, for all major items of system hardware in the Classroom, as furnished by the Selected Firm. Sets will be suitably bound in large 3-ring binders, with section dividers and an Index. One additional set will be turned over to the Multimedia Consultant.

C. The Selected Firm will turn over five complete sets of all Programming Code, Graphic User Interface Pages, Sound System Programming, and any other software-based materials to the University upon final acceptance of installation, for all major items of system hardware in the Classroom, as furnished by the Selected Firm. Sets will be suitably archived onto CD or 3-1/2” disk (CD
preferred), labeled as to Project Name, Date, and Selected Firm, and turned over to the University upon final acceptance of installation. One additional set will be turned over to the Multimedia Consultant.
Attachment 4f
PROPOSAL FORM

(Firm will attach Bill of Materials for the Classroom, showing all major hardware items by Make and Model No., and detailing any variances from this Specification, as herein required.)

BASE BID – Room 107

<table>
<thead>
<tr>
<th>Materials</th>
<th>$______________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor</td>
<td>$______________</td>
</tr>
</tbody>
</table>

CLASSROOM TOTAL $______________

(NOTE: This Total Price must include ALL labor, materials, fees, and any other necessary costs to provide fully operational systems in the classroom, as specified. The University will not be responsible for any additional fees.)
Attachment 5
Multimedia Systems Specifications
for Ruffner Hall
Rooms 223, 281, & 283
and Additions to Rooms 175 & 187
I. Scope

A. Description
1. Overhead Distributed Speaker Systems as noted in the specifications and on the Drawings.
2. A Rack-Mounted Amplifier mounted in each of the Media Cabinets (furnished by the University), containing any necessary support electronics, as specified herein and shown on the Drawings, for Rooms 223, 281 & 283. University-furnished Media Cabinets are equipped with standard 19” rack-rail mounting systems.
3. Peripheral Equipment and Accessories, as noted in the specifications and on the Drawings.
4. Additional Sound Barrier Treatment for the speakers in Rooms 175 and 187, as noted in the specifications.
5. Note: The sound system signal path will include a Volume/Tone Control Card detailed in the Multimedia Control Systems section of this Specification.

B. Performance Criteria
The Sound Systems herein specified are basic guidelines, indicating minimum required functionality and performance criteria. Firms must satisfy the fit, form, and function of the basic designs, but may present viable alternative approaches as their primary bid. Such presentations must be accompanied by a complete proposed Bill of Materials (all major items), and System Risers and/or line drawings indicating system connectivity, and verification that all basic design criteria are being satisfied.

C. Work By Others
Certain provisions have been made for conduit, junction boxes, furniture cutouts, and AC power in the existing University Renovation Work. It will be the responsibility of all firms to review these provisions thoroughly. Any additional
work, either conduit, cutting, patching, etc. necessary to install the firm’s proposed system, and return an area to it’s current finished state, will be the sole responsibility of the firm, and will be included in their price.

II. Overhead Speaker System (three systems required - Rooms 223, 281, and 283)

A. For Speech Reinforcement and Program Playback in the Classrooms, furnish and install six ceiling-mounted speakers in an Overhead Distributed Array, at or near the locations specified on the drawings. The Selected Firm will furnish speaker, 70-Volt transformer, backbox, mounting bezel, baffle plate, tile bridge, Sound Barrier tile and all custom rigging hardware at each location. (As required by submitted product.)

1. The loudspeaker will be of in-ceiling design, consisting of a 165 mm (6.5 in) low frequency transducer, a coaxially mounted 19 mm (¾ in) high frequency transducer, and frequency-dividing network installed in a ported enclosure. The low frequency voice coil will be 25 mm (1 in) in diameter and the coil former will be of aluminum for maximum heat dissipation.

2. Performance specifications of a typical production unit will be as follows:
   a. Measured sensitivity (SPL at 1m [3.3 ft] with 4V input, averaged from 100 Hz to 10 kHz) will be at least 89 dB-SPL. Usable frequency response will extend from 75 Hz to 20 kHz (10 dB below rated sensitivity in half-space) with no external equalization.
   b. Rated power will be at least 70 watts continuous pink noise power, defined as conforming to international standard IEC268-5 (shaped pink noise with peak-to-average ratio of 6 dB) for a period of 100 continuous hours.
   c. The high frequency transducer will be horn-loaded to more evenly cover a minimum 110° conical coverage area.
   d. The backcan will be constructed of formed steel and the baffle of UL94V-0 fire rated high impact polystyrene. An enclosed terminal box will be included proving strain relief for use with either
plenum-rated wire, ½ in (13 mm inside diameter) conduit, or flexible conduit up to 22 mm (M in) outside diameter. The external wiring will be accomplished via a removable lockable wiring connector with screw-down terminals to provide both secure wire termination and prewiring capability before loudspeaker installation. An attachment loop will be provided on the back panel for cabling to building structure as a secondary support point.

e. The system will include a support backing plate to reinforce the ceiling material and tile support rails for use on either 2 x 4 ft or 600 x 1200 mm suspended ceiling tiles and which can all be installed from beneath the ceiling tile.

f. Overall front face diameter will not exceed 252 mm (9.9 in), overall depth from the bottom of the ceiling will not exceed 190 mm (7.5 in), and will weigh no more than 3.4 kg (7.5 lb).

g. The loudspeaker will be equipped with transformer for use in either 70.7 or 100V distributed-line speaker systems, with taps selectable by rotary switch located on the front panel so that the speaker does not have to be removed to adjust tap settings. Taps will be nominally 60W @ 70V, 30W @ 70V (60W @ 100V), 15W @ 70V (30W @ 100V), and 7.5W @ 70V (15W @ 100V).

3. The specified loudspeaker will be the JBL Model Control 26CT, or acceptable equal. All speakers MUST be furnished and installed with tile rails or tile bridges to distribute the weight onto the ceiling grid and not the ceiling tile itself.

B. The specified loudspeaker was chosen for its high-performance, ease of installation and service, clean appearance, and compliance with UL codes for installation in air-handling spaces.
C. All wiring for speakers will be furnished plenum-rated for use in air-handling spaces.

D. Each speaker will be covered over with a 2’ x 2’ (or larger, depending on the proposed speaker assembly) Tile of soft Vinyl Sound Barrier Material, to minimize sound leakage above and through the ceilings. The Sound Barrier Material will be Audioseal™ Sound Barrier, as distributed by Acoustical Solutions, Inc. (http://www.acousticalsolutions.com) or Vinyl Sound Barrier, as distributed by Acoustics First Corp. (http://www.acousticsfirst.com). The tile piece will be mechanically isolated from the speaker backbox assembly with either a section of soft fiberglass or foam and taped or otherwise secured to the ceiling tile to minimize sound leakage from under the vinyl barrier.

E. Acceptable “equals” will include the Bose 102 series (if furnished with integrated system processor), the Altec 309-16T with all appropriate hardware, and the Atlas/Soundolier EQ818-T167 series, with all appropriate hardware. Each of these “equal” series must be furnished with all the required components to meet the specified form, fit, and function of the specified unit.

F. The Selected Firm will coordinate the exact location of the speakers in the rooms with the Multimedia Consultant, accommodating existing conditions. All wiring to and from the individual speakers may be run without conduit in the open ceiling, but must be securely attached to the structure above the ceiling grid in such a manner as to be out of the way of any service requirements for the lighting, plumbing, and HVAC, and must be plenum-rated.

III. Rackmount Mixer/Amplifier (three required - Rooms 223, 281, and 283)

A. For each specified Classroom, furnish and install a Rackmount Modular Mixer/Amplifier system, capable of mixing up to three microphones, and four line input sources. Unit will also be furnished with an independent, transformer-
isolated output. Amplifier section will be capable of supplying up to 150 Watts or greater into a 70-Volt speaker system.

B. Modular Chassis Specifications:
1. The mixer amplifier will have eight modular input channels and one dedicated program input.
2. The master section will include one master volume level control, two EQ controls providing 10 dB of boost or cut at 100 Hz and 10 kHz, a “contour” switch providing 6 dB of boost at 100 Hz and 6 dB of boost at 10 kHz, and a green status LED.
3. Internal muting will be accomplished at the modular level by means of two dedicated mute lines. External muting will be accomplished via screw terminals on the back panel.
4. Provision for an external master volume control will be made through barrier strip connections on the back panel.
5. The unit will be packaged in a rugged metal chassis 17” wide by 3.5” high by 15.5” deep.
6. The unit will be furnished with standard rack-mounting hardware.
7. The unit will operate from 120 volts AC, 60 Hz power.
8. The internal amplifier will be capable of delivering 150 watts RMS into 4 ohms and 8 ohms, as well as providing 25-volt and 70-volt line outputs. The unit will be capable of delivering rated power from 20 Hz to 20 kHz ±1 dB into 4 ohms at its direct output at less than 0.5% distortion with system hum and noise at least 77 dB below rated output.

C. Input Modules
1. The Standard Mic Input Module (three required) will provide a transformer-balanced mic preamp, screw-terminal input, mute capability, and selectable phantom power. This module to be used for the microphone-level output of the Audio Interface Panel, specified elsewhere.
2. The Balanced Bridging Line Input Modules (four required) will provide a transformer-balanced input, screw-terminal connections, and muting capability. Where required, the Input Module will be fitted with a custom resistive-combining network for connection to stereo signal sources.

3. The Balanced Line Output Module (one required) will provide a transformer-balanced output to screw-terminal connections. This module will be for future recording or broadcast capability.

D. The Specified Unit will be the Peavey Architectural Acoustics Division model MMA™ 8150T, or equal, with three MPT-S Standard Mic Input Module, four BTM-S Balanced Line Input Modules, and one TLO-S Balanced Line Output Module. Unit will also be furnished with appropriate rack-mounting hardware.

E. “Equal” series must be furnished with all the required components to meet the specified form, fit, and function of the specified unit.

F. The System Equalizer is intended to be installed in the unbalanced, high-impedance signal-processing loop of the Mixer/Amplifier in these classrooms. The Selected Firm should be prepared to use isolation transformers in this signal path IF required to prevent ground loops. The cost for this/these potential additional item/s should be considered in the Firm’s proposal on this project.

G. Unit will be mounted in the University-installed Media Cabinet. Standard 19” rack mounting hardware is incorporated into the Media Cabinet.

IV. System Equalizer (three required - Rooms 223, 281, and 283)

A. For each classroom, furnish and install a programmable 1/3-Octave Graphic Equalizer with integral Automatic Parametric Notch Filtering for Feedback Suppression. This device will be inserted between the Mixer and the Amplifier
sections of the Mixer/Amplifier product, using the signal-processing loop I/O feature.

B. The System Equalizer is a single channel signal processor that combines an equalizer, feedback reducer, limiter and delay in a single, half-rack enclosure. The unit is designed to be installed in the sound reinforcement signal path to allow equalization of the overall sound system response and automatically detect and control acoustical feedback. The equalizer of the unit can be set to act as a 30–band graphic or a 10–band parametric equalizer. The 1/3-octave graphic equalizer can boost up to 6 dB or cut 12 dB for each band. The parametric equalizer offers adjustable frequency, up to 6 dB of boost or 18 dB of cut, and up to a two-octave bandwidth. The feedback reducer of the unit automatically inserts narrow notch filters at detected feedback frequencies. These notch filters stop a sound system from feeding back, but are narrow enough so their effect on audio quality is minimized. The feedback detection algorithm constantly searches for feedback, with or without the presence of program audio.

1. Hardware Features
   b. 48 kHz sampling rate provides flat response to 20 kHz.
   c. Onboard Scenes can be selected via front panel buttons.
   d. ½ rack space chassis allows rack mounting of one or two units in a single rack space with no sagging or bending.
   e. Link Interface allows multiple Link devices to be controlled with a single computer.
   f. There are no internal batteries. Settings and DSP program are stored in internal EEPROM.
   g. Electronically balanced input features combination ¼” and XLR connector and can be used with balanced or unbalanced outputs.
h. Independently driven, cross-coupled, balanced ¼” and XLR outputs can be used with balanced or unbalanced inputs, without signal loss.

i. Input and output levels are +4 dBu/–10 dBV DIP-switch-selectable.

j. Processor engine will feature full 24-bit internal processing.

k. RS-232 interface allows external computer control and firmware updates.

l. Internal linear power supply is switchable between 120 and 230 Vac.

m. Solid-state bypass eliminates unreliable mechanical relays.

2. Software Features

a. Adaptive Notch Filter algorithm (patent pending) automatically detects feedback and deploys up to 10 narrow band notch filters.

b. A tamper-proof equalizer can be switched between 30-band graphic or 10-band parametric equalizer.

c. The graphic equalizer is a constant-Q, 30-band, 1/3-octave graphic equalizer. It can boost up to 6 dB or cut 12 dB for each band.

d. The parametric equalizer offers 10 filters with adjustable frequency, up to 6 dB of boost or 18 dB of cut, and up to a two-octave bandwidth.

e. Up to 1.3 seconds of Digital Delay.

f. Front and back panels both feature lockout controls.

g. The Response Curve Viewer displays frequency response of the feedback reducer, equalizer, or both.

h. 10 scenes can be stored on board. Multiple scenes can be stored to floppy or hard disk.

i. The Limiter provides added protection to external speakers and amplifiers.
C. Specifications

1. Frequency Response: 20 to 20k Hz, ±1.0 dB re 1 kHz
2. Dynamic Range: 104 dB minimum, A-weighted, 20 Hz to 20 kHz
3. Sampling Rate: 48 kHZ
4. Digital-to-Analog, Analog-to-Digital Conversion: 20 bit resolution
5. Voltage Gain:
   a. 1 dB ± 1 dB (power off)
   b. 0 dB ± 2 dB (equal input and output sensitivities)
   c. 12 dB ± 2 dB (input –10 dBV, output +4 dBu)
   d. 12 dB ± 2 dB (input +4 dBu, output –10 dBV)
6. Impedance:
   a. Input: 47 ± 20% actual
   b. Output: 120 ± 20% actual
7. Input Clipping Level:
   a. +18 dBu minimum (at +4 dBu setting)
   b. +4 dBV minimum (at –10 dBV setting)
8. Output Clipping Level:
   a. +18 dBu minimum (at +4 dBu setting)
   b. +4 dBV minimum (at –10 dBV setting)
9. Total Harmonic Distortion: < 0.05% at 1 kHz, +4 dBu, 20 to 20 kHz
10. LED Signal Indicators:
    a. Clip: 6 dB down from input clipping
11. Propagation Delay from Input to Output: 1.0 ms, all filters set to Flat (0 ms delay setting)
12. Polarity:
    a. Input to output: non-inverting
    b. XLR: pin 2 positive with respect to pin 3
    c. ¼-in. TRS: tip positive with respect to ring
13. Feedback Filters:
    a. Ten 1/10-octave adaptive notch filters from 60Hz to 20 kHz
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b. Deployed to 1 Hz resolution of feedback frequency
c. Deployed in depths of 3 dB, 6 dB, 9 dB, 12 dB, and 18 dB (12.5 d. Low Q in graphic EQ mode) attenuation
d. Filter shape variable between HI-Q and LOW-Q

14. Graphic Equalizer:
   a. Frequency Bands: 30 bands on ISO, 1 / 3-octave centers
   b. Filter Type: 1/3-octave, constant Q
c. Maximum Boost: 6 dB per band
d. Maximum Cut: 12dB per band
e. High- and low-pass filters: 12dB/octave nominal

15. Parametric Equalizer:
   a. Frequency Bands: 10 bands, variable frequency, variable Q
   b. Boost/Cut Range: +6 dB to –18 dB per band
c. Q Range: 1/40-octave to 2-octave
d. Shelf/Rolloff Filters:
   • Shelf: +6 to –18 dB per filter
   • Rolloff: 6dB, 12dB, 18dB, or 24dB per octave nominal

16. Delay:
   a. Up to 1.3 seconds

17. Limiter:
   a. Threshold: –60 dB to –0.5 dB, 0.5 dB resolution
   b. Attack: 1 ms to 200 ms
c. Decay: 50 ms to 1000 ms
d. Ratio: Infinity to 1

18. Operating Voltage:
   a. 120 Vac, 50/60 Hz, 75 mA max

19. Temperature Range:
   a. Operating: –7° to 49° C (20° to 140° F)

20. Dimensions:
   a. 219 mm x 137 mm x 44.5 mm
b. 8-5/8 in. x 5-3/8 in. x 1-3/4 in.

21. Weight:
   a. 930 g (2.05 lbs.)

D. The Specified Unit will be the Shure Model DFR11EQ-V5, or equal.

E. Acceptable “equals” will include the comparable products from the following manufacturers that either meet or exceed these specifications. Acceptable manufacturers will be Sabine, Inc, Rane, Biamp, BSS, and Peavey MediaMatrix. Any substitutions must meet the fit, form, and function of the specified product, and include any additional mounting hardware required. The use of processors that employ manual hardware-controlled operation will not be acceptable.

F. The Selected Firm will provide to the University, upon completion of the installation, the Configuration Software and the individualized setup files for each of the two classrooms.

V. Wired Microphone/Audio Interface Systems

NOTE: All quantities noted in this section are PER CLASSROOM (Rooms 223, 281 and 283).

A. Wired Condenser Lavalier Microphone (one required)
   1. For each classroom, furnish one standard, wired condenser lavalier microphone.
   2. The product specified incorporates the following features.
      a. Interchangeable cartridges that provide an optimal choice for each application.
      b. Rotatable tie clip that pivots in 90° increments for placement flexibility.
      c. Supplied snap-fit foam windscreen that controls breath noise and stays on securely.
d. Balanced, transformerless output for increased immunity to noise over long cable runs.

e. Supplied dual tie clip holds two microphones for dual micing applications.

f. Type of microphone will be an electret condenser, cardiod pickup pattern, frequency response 50 to 17,000 Hz, sensitivity –53.5 dB, maximum SPL 123 dB, and signal-to-noise ratio 70.5 dB (referenced at 94 dB-SPL). Unit will be phantom-powered by 11 to 52 VDC @ 2.0 mA maximum. Unit will be furnished with a properly terminated cable, minimum 4’ in length. Unit will also be furnished with a 25’ balanced microphone extension cable.

3. The specified product will be the Shure Model MX185, or equal.

4. Acceptable “equals” will include the comparable products from other manufacturers that either meet or exceed these specifications. Acceptable manufacturers will include Electro-Voice, AKG, Audio-Technica, Sennheiser, Sony, Telex and Beyerdynamic. Any substitutions must meet the fit, form, and function of the specified product.

B. Audio Interface Panel (one required)

1. For each classroom, furnish and install one Audio Interface Panel, which will be installed on a University-furnished standard 2-Gang NEMA wall box. This device will be mounted on the Media Cabinet, depending on the individual classroom, at the location designated on the drawings, or as approved by the Multimedia Consultant.

2. The product specified incorporates the following features.

   a. The signal splitting/impedance matching unit will be suitable for interfacing one unbalanced high- or low-impedance source to one balanced or floating low-impedance (1.0K ohm nominal) microphone preamplifier input.

   b. There will be one ¼” (6.3mm) 2-conductor phone jack, and two RCA phone jacks to provide input for the source. There will be a
16-ohm, 5.0-watt load resistor to accommodate speaker-level sources. There will be a Left + Right resistive mixer summing the RCA inputs to accommodate line-level sources. The output will be a balanced, low-impedance, mic level signal, which will be brought to a barrier strip. This section of the panel will include a 10K-ohm level control, with a 0-10 calibrated knob, for further signal level matching.

c. There will be one 3-pin female XLR-type connector, independent of the above, for pass-thru connection of low-impedance mics.

d. The primary electrostatic shield will be connected to the source input ground and to the mounting plate. The secondary electrostatic shield will be connected to pin 1 of the low-impedance XLR output. There will be a ground lift switch to allow the shields to be connected together or isolated as required. The XLR output connector will be wired with pin 2 “hot” or “in phase” with respect to the input, and pin 3 “cold” or “out-of-phase”.

e. The Interface will be furnished on a single two-gang standard NEMA Wall Plate. Epoxy silk-screening will identify control functions. Switches will be of the miniature “rocker” type and will be recessed.

3. The specified signal splitting/impedance matching unit will be a Pro-Co Monoface AVP-1V Audio-Visual Interface.

4. Acceptable “equals” will include the comparable products from other manufacturers that either meet or exceed these specifications. Any substitutions must meet the fit, form, and function of the specified product.

VI. Wireless Microphone Systems

NOTE: All quantities noted in this section are PER CLASSROOM (Rooms 223, 281 and 283).
A. Furnish and install one Wireless Lavalier Microphone System operating in the UHF frequency range. The System will be furnished with Receiver, Transmitter, and specified microphone, or microphone capsule.

B. The recommended Wireless System will be a frequency–agile diversity system operating in the UHF band. Both the receiver and the transmitter will be synthesizer controlled via Phase Locked Loop (PLL) circuitry for a clear, steady signal.

C. Performance Features:
1. UHF band operation
2. Frequency–agility will allow user to change system frequency if interference is encountered. Over 100 user–selectable frequencies will be available.
3. Up to 16 systems can operate simultaneously.
4. Noise Squelch Circuitry will analyze signal quality rather than signal strength, virtually eliminating the possibility of noise bursts
5. Tone Key Squelch will prevent unwanted noise from entering the system, including the ‘pop” noise that occurs when the transmitter is turned on and off
6. Extensive rf and audio metering
7. Low transmitter battery warning LED on receiver
8. Preconfigured Group/Channel and frequency for simplified setup of multiple wireless systems
9. Two Band EQ feature on receiver to fine tune frequency response
10. Receiver logic capability to control external equipment
11. Remote mute feature on bodypack; optional accessory switch to externally mute bodypack transmitter during operation

D. Components
2. Diversity Receiver with external in-line power supply (100/120/230 Vac)
3. Microphone capsule furnished will be identical to that specified in Item V.A. above, Wired Condenser Lavalier Microphone.

E. Specifications
1. RF Carrier Frequency Range: 774–862 MHz (782–806 MHz for U.S. models)
2. Working Range: 152.4 m (500 ft), minimum, under typical conditions; 487.6 m (1600 ft.) line of sight. NOTE: Actual working range depends on RF signal absorption, reflection and interference.
3. Audio Frequency Response: 45 to 15,000 Hz, ±2 dB. NOTE: Overall system frequency response depends on the microphone element
4. Modulation: ±45kHz deviation compressor-expander system with pre-and de-emphasis (U.S. models only; international models may vary)
5. RF Power Output: 50 mW, typical
6. Dynamic Range: >100 dB, A-weighted
7. Receiver Audio Output Level (Maximum): +5 dBu typical, unbalanced output; +14 dBu typical, balanced output
8. RF Sensitivity: –108 dBm at 12 dB SINAD
9. Image Rejection: 90 dB typical
10. Spurious Rejection: 70 dB typical
11. Ultimate Quieting (ref. 45 kHz deviation): >100 dB, A-weighted
12. Audio Polarity: Positive pressure on microphone diaphragm produces positive voltage on pin 2 with respect to pin 3 of low impedance output and the tip of the high impedance 1/4-inch output
13. System Distortion (ref. ±45 kHz deviation, 1 kHz modulation): 0.4% Total Harmonic Distortion typical

F. Power Requirements
1. Transmitter: 9V alkaline battery (Duracell MN1604 recommended); NiCad optional
2. Receiver: 15 Vdc, 600 mA 50/60 Hz
3. Power Consumption: 600 mA x 15 V, maximum Transmitter Battery Life (Typical) 8 hours (with Duracell MN1604 9V alkaline battery)

G. Operating Temperature Range
1. 7 to 49 C (20 to 120 F) NOTE: Battery characteristics may limit this range

H. The specified system will be the Shure UC14/85, or equal.

I. Acceptable “equals” will include products by Vega, Telex, AKG, Sennheiser, and Sony. Any substitutions must meet the fit, form, and function of the specified product, and include any additional mounting hardware required. Proposed substitutions must be approved in the Submittal process, but may be specified in the bid by manufacturer and model no.

J. Note: It will be the responsibility of the Firm to determine optimal frequency selection, receiver antenna selection and placement. Any additional wiring, hardware (different antennas, boosters, splitters), or mounting, if required for reliable operation of the wireless microphone system, will be included in the Firm’s price, at no additional cost to the University

VII. Additional Sound Barrier Treatment for Rooms 175 and 187

A. For Rooms 175 and 187, the Selected Firm will retrofit/install Vinyl Sound Barrier Tiles over the existing ceiling speakers.

B. Each speaker will be covered over with a 2’ x2’ (or larger, depending on the proposed speaker assembly) Tile of soft Vinyl Sound Barrier Material, to minimize sound leakage above and through the ceilings. The Sound Barrier Material will be Audioseal™ Sound Barrier, as distributed by Acoustical Solutions, Inc. (http://www.acousticalsolutions.com) or Vinyl Sound Barrier, as
distributed by Acoustics First Corp. ([http://www.acousticsfirst.com](http://www.acousticsfirst.com)). The tile piece will be mechanically isolated from the speaker backbox assembly with either a section of soft fiberglass or foam and taped or otherwise secured to the ceiling tile to minimize sound leakage from under the vinyl barrier.

VIII. Audio Wire and Cable

A. Speaker wiring will be 18 ga. or larger for 70 Volt distribution, 14 ga. or larger for low-Z speaker lines, and 22 ga. or larger shielded, twisted-pair for microphone/line levels. The use of multi-core cables is encouraged wherever practical. For this project, the use of plenum-rated cable is required.

B. All new cable runs to microphone, line, or speaker junction boxes will include a minimum of 20% spares, for future use if required. If all existing cables in a conduit are used in this project, additional spares will be installed to comply with this requirement.

C. All conduits used by the Selected Firm will be left with a pull-string installed.

D. All cable “home runs” must be continuous, with no splices.

IX. Sound System Installation

A. General


2. It is the University’s intent that the operation of this system be as simple and intuitive as possible. To that end, firms proposing alternate equipment should exercise due caution in overly complicating their proposal.
B. Field Quality and Control

1. The Selected Firm must examine areas and conditions under which sound equipment and controls are to be installed and notify Multimedia Consultant in writing of any conditions detrimental to the proper completion of the work. The Selected Firm will not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to both parties.

2. All wiring and equipment must be new, in factory sealed cartons, prior to its installation on the job.

3. The Selected Firm will maintain a Project Foreman for the job, who will remain the same throughout the period of installation and acceptance, unless changes are required due to illness or other causes beyond The Selected Firm’s control.

C. Installation

1. System Grounding
   a. The wiring and shielding of all signal cables will be maintained insulated and ungrounded until deliberate connection is made at one, and only one, point, as per an overall grounding plan.
   b. The above provision will be modified when unbalanced lines, or coaxial-unbalanced cable systems are employed, where applicable.

2. All system work, both inside and outside of the Backbox unit/s, Media Cabinets, and junction boxes, will be subject to inspection and approval with respect to neatness, good engineering practices, selection and use of materials, and professional appearance. All cables will be labeled at both ends, and on the system drawings (as-built), for ease of servicing and/or future modifications. All controls will be clearly labeled as to function and nominal setting. All labeling and marking will be complete and in place prior to Final Testing.

3. All wires connecting to binding posts, terminals, or barrier strips will be fitted with compression lugs, sized properly for the wire and termination
point. The use of wire-nuts, or other free-floating methods of connection will not be allowed, except for speaker connections.

4. Provisions have been made in the conduit layout to minimize the need to run signals from the different systems in the same pipe. Wherever feasible, within the limitations of the conduit layout, sound system wiring should be run in dedicated pipes, and under no circumstances should run in any conduit with high-voltage AC wiring.

5. All conduit systems, cabinets, racks, or other sound equipment must be grounded properly. Where PVC conduit is used, a continuous ground conductor, no less than #12 Copper, will be installed through the conduit to connect equipment grounds at the termination points, or bond racks and/or conduit.

6. The Selected Firm will label all devices, panels, jacks, and controls as to their functionality. Labels will be internal (insert labels for buttons, and similar), directly engraved, silk-screened, or engraved on Lamacoid-type permanent-adhesive labels. The Selected Firm will coordinate the labeling, choice of names or icons, and placement with the Multimedia Consultant and the Project Coordinator for ITC. No labels will be applied or finalized without signed approval by the University’s Project Coordinator, or their designated representative. It is the desire of the University to keep the naming or identification of devices, jacks, and controls as intuitive and simple as possible.

The use of “tape” style labels will not be acceptable for this project.

X. Proof-of-Performance & Testing

A. The Selected Firm will, in the presence of University and/or any designated representative of University, and the Multimedia Consultant, demonstrate all items and functions of the new sound systems, showing them to be fully functional and capable of performing the tasks required.
B. In operation, the Sound Systems will have no audible buzzes, clicks, pops, or other noises that might detract from the planned functions in the facility. The Selected Firm will demonstrate system noise levels to the University, certifying compliance with this requirement. The Sound Systems must be demonstrated with all other Multimedia systems active, especially the classroom lighting, to verify that there is no audible “dimmer noise” or other system noises that might occur in normal operation.

C. All required measurements noted hereafter must be done in the presence of University, or a designated representative of University, and the Multimedia Consultant. All equipment used in making measurements must be fully documented and approved prior to testing, for acceptance by the Multimedia Consultant. Equipment not meeting acceptable standards will not be allowed and The Selected Firm will furnish acceptable equipment at their own expense.

D. Overhead Distributed Speaker System Frequency Response
   1. For Rooms 223, 281, and 283, System Frequency Response will be “optimized” for maximum gain-before-feedback and intelligibility in the speech range, using the installed system equalizer, to the response curve designated in Item 2. However, it should be noted that full-range audio playback from a VCR and other possible sources will be handled by the same speaker system, and this should be considered in the final equalization choices.
   2. The recommended frequency response should be nominally flat, +/- 3 dB, from 100 Hz.-4000 Hz., with a gradual 2 dB/octave rolloff above that point. This will be designated the “House Curve”. The “House Curve” will be fully documented in print, and made available to the Multimedia Consultant at the time of Final Testing, certifying compliance with these requirements. Acceptable types of test equipment that may be utilized are laboratory-grade 1/3-Octave Real-Time Analyzers (w/printout capability), dual-channel FFT Analyzers (SmaartPro or SmaartLive), TDS analyzers
(TEF, MLSSA, SYSID), or warble-tone generators with averaging filters and chart recorder. Swept sine wave measurements will not be acceptable for this purpose. Manually graphed measurements will not be acceptable for this purpose.

E. System Phasing
Using acceptable methods of polarity testing, the Selected Firm will certify that all microphones and speakers are properly and additively phased. A checklist will be made available to the Multimedia Consultant at the time of Final Testing, certifying that polarity testing has been done on all items.

F. Individual Source Testing
The Selected Firm will, in the presence of all attendees, demonstrate and verify the proper performance of the Wired and Wireless Mics (if applicable), the Audio Interface, VCR audio, and the audio from a computer (The Selected Firm-furnished laptop, if University-furnished computer is not available at the time of testing.). Appropriate levels will be set and suitably marked for all major local signal sources prior to Final Testing (note that these may need to be adjusted in the testing phase).
I. Scope

A. Description

1. This section includes all Multimedia Video/Graphics Equipment. Included in this section will be an XGA LCD Video/Graphics Projector, a VHS/S-VHS Recorder/Player, a Video/Graphics System Switcher/Scaler, a Broadband Tuner, a Visual Presenter (Optional), an internal Computer Interface for University-furnished local PC, and a cabinet-mounted Computer Interface in the quantities as noted in the specifications and on the Drawings.

2. Additional Broadband Tuners for Rooms 175 and 187, as noted in the specifications.

3. Peripheral Equipment and Accessories, as noted in the specifications and on the Drawings.

4. The Selected Firm is responsible for furnishing fully operational systems to University on completion of this project. Items not specifically listed in this section, but required for proper operation of the systems herein described, will be the responsibility of the Selected Firm to provide as part of the package.

B. Performance Criteria

The Video Systems herein specified are basic guidelines, indicating minimum required functionality and performance criteria. Firms must satisfy the fit, form, and function of the basic designs, but may present viable alternative approaches as their primary bid. Such presentations must be accompanied by a complete proposed Bill of Materials (all major items), and System Risers and/or line drawings indicating system connectivity, and verification that all basic design criteria are being satisfied.
C. Work By Others

Certain provisions have been made for conduit, junction boxes, furniture cutouts, and AC power in the existing University Renovation Work. It will be the responsibility of all firms to review these provisions thoroughly. Of specific note should be that the various wall and cabinet-mounted junction boxes and conduit runs are being furnished and installed by the University, and are as noted on those drawings and specifications. Any additional work, either conduit, cutting, patching, etc. necessary to install the firm’s proposed system, and return an area to it’s current finished state, will be the sole responsibility of the firm, and will be included in their price.

II. Video System Equipment

A. Video Projectors (three required)

1. For Rooms 223, 281, and 283, furnish and install one ceiling-mounted LCD Color Multimedia Projector. The Projector will be located at the approximate designated point on the Drawings, and will be securely mounted to the actual ceiling structure or trusses. Mounting to the ceiling tile grid will not be acceptable. Projector will also be secured to its mount in such a fashion as to discourage theft or tampering.

2. The actual fixed location of each projector will be determined by the Selected Firm and approved by the Multimedia Consultant prior to installation. No mounting will be commenced without this prior determination and approval. The Selected Firm will ensure that the projector is mounted level, rigid, and at a mounting height suitable for projection on the furnished screens with no keystoning effects. Any mounting that may affect the structural aspects of the room (ceiling grid, duct work, etc.) must be approved by the University’s Facilities Management Dept. representative prior to commencement of installation.

3. The specified product incorporates the following features.
   a. Display Technology: 1.3” polysilicon; TFT LCD x 3
b. Resolution: XGA 1024 x 768

c. Resolutions Supported: XGA (1024 x 768), Fit-to-View display of VGA (640 x 480), SVGA (800 x 600), SXGA (1280 x 1024), MAC

d. Brightness: 2200 ANSI lumens

e. Contrast Ratio: 350:1 (ANSI 100:1)


g. Video Compatibility: NTSC, NTSC 4.43, PAL, PAL-M, PAL-N, SECAM, HDTV

h. Sources: 2 RGB computer, 2 audio, 1 composite video, 1 S-video, 1 component/HDTV Video

i. H-Sync Range: 15 to 100 KHz

j. V-Sync Range: 50 to 100 Hz

k. Dot Clock: 165 MHz

l. Aspect Ratio: std: 4:3 - wide: 16:9

m. Image Size (Diagonal): 30” to 400”

n. Lens: Power zoom and focus lens 1.3:1 ratio; Focal length: 1.9” to 2.47”, F 1.8 to F 2.1

o. Projection Distance (From Screen): 4.6 ft to 47.2 ft


q. Lamp: 200 watt (UHP)

r. Audio: 3W + 3W RMS stereo

s. Remote Control: Laser F/X wireless IR remote with mouse control and laser pointer

t. Dimensions: 10.2” W x 15.4” L x 6.3” H

u. Weight: 15.2 lbs.

v. Power Consumption: 300 watts

w. Power Requirements: 100 to 120V / 220 to 240V at 50/60 Hz
x. Operating Temperature (Sea Level): 41 F to 95 F (5 C to 35 C)
y. Approvals: FCC Class A (U.S.), UL, c-UL (Canada), CE
z. Warranty: three year parts and labor (excluding lamp); 90 days lamp

4. The specified LCD Projector will be the Sanyo Model PLC-XP20N, comparable models (equal) from Proxima or Eiki, or acceptable “equals” as defined below (subject to Item 7).

5. The LCD Projector will be supplied with a NEMA-Enclosure Series-Mode Surge Suppressor, which will be the Surge-X Model SX15-NE (see http://www.surgex.com ). The use of Shunt-Mode Surge Suppressors will not be acceptable. The Surge Suppressor will be installed by the University, in series with the University-supplied AC outlet designated for the projector. The Selected Firm will be responsible for furnishing the specified Surge Suppressor to the University Facilities Management Division for installation. The University’s Project Coordinator will arrange coordination of delivery.

6. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product. Other manufacturers whose products “may” be “equal” include Toshiba, Epson, In-Focus, Barco, NEC, Sharp and Sony. However, the Firm specifying one of these potential “equals” must provide with their bid a “detailed” description showing how their product differs from the specified unit, and what advantages/disadvantages it may have.

Products proposed which are not capable of “true” or “native” XGA resolution will not be acceptable.

7. NOTE: The University has purchased a reasonable quantity of the same manufacture or type Projector as herein specified. ITC staff and University faculty have been trained in its operation, and are currently
familiar with its features and capabilities. ITC wishes to continue the use of this type unless compelling reasons can be presented for making a change. Therefore, preference will be given to those firms furnishing this line item “as specified”. Firms wishing to submit “equals” must provide all of the information noted above, as well as an additional narrative explaining the advantages to the University which might prove more beneficial than the continuity of models as described herein.

B. Multimedia Input Plate / Computer Interface (three required)

1. For Rooms 223, 281, and 283, furnish one Multimedia Input Plate / Computer Interface. This device will be permanently Media Cabinet-mounted (see University dwgs.)

2. The Interface will be a high performance computer video interface for analog video signals including VGA, SVGA, XGA, MAC, SUN and other high-resolution workstations. The unit will have a modular faceplate designed to accept A/V connector plates, allowing the unit to also act as a customizable A/V connector plate. The unit will mount in the wall of the media cabinet, with or without a backbox, as required by the furnished unit. The University has NOT provided a backbox in the Media Cabinet design. The unit will be furnished with a White finish for Media Cabinet mounting.

3. The Interface will perform the following two primary functions:
   a. Signal Splitting - allows the simultaneous connection and viewing of both the computer’s local monitor and a second output device such as a large screen data projector or monitor.
   - The University will furnish the Local PC and the Local Flat-Panel LCD Monitor for each room.
   - The Selected Firm will be responsible for all cabling between these two devices and their proposed equipment complement.
• Provision has been made for a blank panel on the side of the Media Cabinet for mounting an external HD15 connector - to be use for connection to the University-furnished Monitor.

b. Physical Interfacing - Computers employ many different types of video output connectors, making it difficult to hook up computers directly to data projection devices. The Interface simplifies interfacing, routing, and switching tasks by acting as universal adapters. Through the use of removable input cables, the Interface can be attached to different computers and will provide a video output signal on five BNC connectors that can easily be connected to an RGB display device. The output signal format may be set to any of the following formats: RGBHV (default), RGBS, and RGsB.

4. The specified product incorporates the following features.

a. Installation Design - unit mounts in a wall, floor box, conference table, podium or other A/V furniture

b. 300 MHz (-3dB) RGB video bandwidth
c. ADSP™ Advanced Digital Sync Processing™, or equivalent, to ensure sync compatibility with digital displays such as LCD projectors.
d. Active PC audio interfacing, to provide a buffered, balanced stereo output to the audio system
e. Horizontal shift control
f. Composite or separate horizontal and vertical sync (DIP switch-selectable)
g. Sync on green output (DIP switch-selectable)
h. Serration pulse removal (DIP switch-selectable)
i. DDSP™ Digital Display Sync Processing™, or equivalent, to ensure sync stability with LCD projectors
j. ID bit termination on pins 4 and 11
k. Installation plate for use in existing walls without the need for masonry boxes
l. Four spaces for Architectural Adapter Plates for signal pass-through connectors

5. Compatibility:
   a. Input Signals: The Interface will accept high-resolution video signals from virtually any computer that outputs an analog video signal. The unit will work with signals at virtually any resolution and refresh rate. Compatible computer video signals include VGA, SVGA, XGA, MAC, SUN, SGI and other high-resolution computers outputting an analog video signal. Input signal compatibility parameters are listed below.
   - Video Signal: Analog RGB Video
   - Signal format: RGBHV, RGBS, RGsB, RsGsBs
   - Horizontal Frequency Range: 15 KHz to 130 KHz
   - Vertical Refresh Rates: 30 Hz to 120 Hz

b. Output signals: The Interface will accept high-resolution video signals from virtually any computer that outputs an analog video signal. The unit will work with signals at virtually any resolution and refresh rate. Compatible computer video signals include VGA, SVGA, XGA, MAC, SUN, SGI and other high-resolution computers outputting an analog video signal.

6. Performance Specifications:
   a. Video input
      - Number/signal type: 1 analog RGBHV, RGBS, RGsB, RsGsBs
      - Connectors: (1) 15-pin HD male (Mac and Sun/SGI to VGA adapter cables are available)
      - Nominal level: Analog — 0.7V p-p
- Minimum/maximum levels: Analog — 0.3V to 1.5V p-p
- Horizontal frequency: 15 kHz to 130 kHz
- Vertical frequency: 30 Hz to 120 Hz

b. Audio input
- Number/type: (1) PC level stereo, unbalanced
- Connectors: (1) 3.5 mm stereo jack, 2 channel
- Impedance: 10 k-ohms, DC coupled
- Minimum level: 100mV

c. Sync Input type: RGBHV TTL (+/-), RGBS TTL (+/-), RGsB 0.3V (-), RsGsBs 1.3V (-)

d. Video throughput
- Gain: Unity, 0.725V p-p with 50% peaking, 0.750V p-p with 100% peaking
- Bandwidth: 300 MHz (-3dB)

Controls:

e. Video output
- Number/signal type: 1 analog RGBHV, RGBS, RGsB
- Connectors: 5 BNC female; 15-pin HD female (buffered local monitor output)
- Nominal level: Unity, 0.725V p-p with 50% peaking, 0.750V p-p with 100% peaking

f. Audio output
- Number/type: 1 stereo (2 channel), balanced/unbalanced
- Connectors: 3.5 mm stereo captive screw terminal
- Impedance: 50 ohms unbalanced, 100 ohms balanced

g. Sync Output type: RGBHV, RGBS, RGsB (switch-selectable)
h. Sync Polarity: When RGBHV is input, polarity follows input; and jumper is set to follow, otherwise negative; RGBS, RGsB negative

7. Mechanical Specifications:
a. Power: 12 to 24VAC or VDC, 0.5 A, 5 watts, external
b. Enclosure type: Metal
c. Faceplate: 4.5" H x 8.33" W

d. Enclosure dimensions: 2.5" H x 3.7" W x 1.74" D

e. Shipping weight: 3 lbs (1.4 kg)

f. Approvals: UL, CUL, CE, FCC Class A

8. The specified unit will be the Extron RGB 558 Architectural Universal, 15-Pin HD Input, Mountable Interface with Audio, ADSP™ and Optional Architectural Plates, or equal product by Inline.

9. The specified units will be furnished and installed with one each Extron Model 70-107-26 Combination Pass-through Plate (or equal by Inline), and Extron Model 70-103-21 XLR 3-Pin Female Module (or equal by Inline). Color will match Interface unit.

10. The specified units will be furnished with one Extron 26-491-03 HD15 Laptop Breakout Cable w/Audio, 12’ in length, or equal product by Inline.

11. The Selected Firm will also furnish a 10’ HD15 VGA Extension Cable to the University’s representative, for use in further extending the Local Monitor’s cable.

12. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product. Note that a junction box is not being furnished and installed by the University.

C. High Resolution Computer Interface (Eight required)

1. For Room 223, furnish and install one each. High Resolution Computer Interface inside the Media Cabinet and used in conjunction with University-furnished Local PC. The RGB output of the unit will connect to an input on the Video Switcher/Scaler, as noted on the drawings. The Buffered Monitor Output will feed to a University-furnished Local PC Monitor.

For Room 223, furnish and install five additional High Resolution
Computer Interfaces on the University-furnished Workstation Tables. Each Workstation Table will have a University-furnished Local PC and Monitor. The RGB outputs of these units will connect to any of six HD15 Jacks (with accompanying stereo audio) which the Selected Firm will mount in the Raceway (University-installed) which runs around the perimeter of the room. The HD15 Jacks will connect to VGA and audio inputs on the Expanded Switcher/Scaler System, as configured for this room (Room 223) only.

a. The University will furnish the Local PCs and the Local Flat-Panel LCD Monitors or CRT Monitors.

b. The Selected Firm will be responsible for all cabling between these devices, their proposed equipment complement in the Media Cabinet, and the HD15 and Audio Jacks mounted on the Raceway, as applicable.

c. The Selected Firms will furnish five appropriate portable VGA cables, 15’-20’ in length, for connection from the Computer Interface Outputs on the Workstation Tables to the Raceway HD15 Jacks. These cables will carry both RGBHV and stereo audio.

d. Provision has been made for a blank panel on the side of the Media Cabinet for mounting an external HD15 connector - to be used for connection to the University-furnished Local Monitor from the Media Cabinet Local PC.

2. For Rooms 281 and 283, furnish and install one each. High Resolution Computer Interface inside the Media Cabinet and used in conjunction with University-furnished Local PC. The RGB output of the unit will connect to an input on the Video Switcher/Scaler, as noted on the drawings. The Buffered Monitor Output will feed to a University-furnished Local PC Monitor.

a. The University will furnish the Local PCs and the Local Flat-Panel LCD Monitors.
b. The Selected Firm will be responsible for all cabling between these devices and their proposed equipment complement.

c. Provision has been made for a blank panel on the side of the Media Cabinet for mounting an external HD15 connector - to be used for connection to the University-furnished Local Monitor from the Media Cabinet Local PC.

3. The Computer Interface is a dedicated high resolution, 300 MHz RGB bandwidth, VGA, SVGA, XGA, SXGA, VESA, & XGA-2 compatible interface, designed to provide high-resolution performance for vertical scan rates from 30-125 Hz. A separate buffered workstation monitor output (15 pin HD) will be included.

4. The product specified incorporates the following features:
   a. VGA, SVGA, XGA, SXGA, VESA, & XGA-2 compatible computer-video interface (using 15 pin HD connector)
   b. 300 MHz RGB video bandwidth (-3 dB)
   c. Advanced Digital Sync Processing for improved interface with LCD display devices.
   d. Active PC Audio interfacing to balanced line.
   e. Three position gain and peaking/sharpness switches
   f. Computer 15 pin HD input cable included
   g. Separate buffered 15 pin VGA monitor output may be extended up to 75 feet
   h. LCD scan rate indicator of horizontal & vertical frequencies
   i. Automatic sync output detection
   j. Outputs RGBS, RGsB or RGBHV
   k. Horizontal centering control (with ON/OFF switch)
   l. Automatic Sync Stripping from red, green, and blue
   m. Serration Pulse Removal (dip-switch selectable)
   n. Metal enclosure
5. Performance Specifications:
   a. Video Input:
      • Analog male 15 pin “HD” direct input computer cable attached.
      • Horizontal Frequency range: 15-125 kHz
      • Vertical Frequency range: 30-120 Hz.
   b. Video Output:
      • Analog RGB and sync, RGsB or RGBHV sync
      • Buffered female 15 pin HD monitor output.
   c. Video Bandwidth:
      • Actual bandwidth (AB): 300 MHz (-3dB)
   d. Audio Input
      • PC level, stereo
      • 3.5 mm stereo plug, 24’’ cable attached to HD-15
      • Impedance: 10 kOhms
   e. Audio Output
      • Balanced Line level, stereo
      • Connector: captive screw terminals
      • Impedance: 100 ohms, balanced

6. Mechanical Specifications:
   a. Power supply US/Canada version: 100 VAC to 240 VAC, 50/60 Hz, 15 Watts, internal, auto-switchable
   b. Approvals: UL, CUL, CE, FCC Class A
   c. Dimensions: 6.35” W x 6.5” D x 1.75” H
   d. Shipping weight: US/Canada-4 lbs. (1.8 kg)
   e. Enclosure: Metal

7. The specified unit will be the Extron RGB 109xi, or equal.

8. The specified unit, or equal, will be furnished with a 10’-15’ HD15 VGA Extension Cable, for purposes of extending the distance from the HD15
jack on the exterior of the Media Cabinet to the Local Monitor. There will be three cables required, one each for Rooms 223, 281, and 283.

9. Acceptable “equals” will include comparable products from other manufacturers which either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product. Note the requirement for a buffered monitor output.

D. Video/Graphics Switcher/Scaler (three required)
1. For Rooms 223, 281, and 283, furnish and install one 7x1 Switcher with Built-In Video Scaler. This unit will be mounted in the equipment rack section of the Media Cabinets, and will be used to select from multiple Video, S-Video, or RGB sources to route to the Video Projector.
2. Note: Room 223 will have an additional 6-input VGA + Audio Switcher “slaved” to the specified Switcher/Scaler, to allow for additional system inputs.
3. The specified product is a seven input, dual output, multi-format switcher with a built-in video scaler. The unit features system control along with RGB & video integration capabilities ideal for permanent installations using plasma displays as well as CRT, LCD, and DLP projectors.
4. This system switcher provides video scaling, which uses advanced up-conversion technologies to match the rates and resolutions of video inputs to the higher native resolution of today’s fixed matrix displays. RS-232 or IR projector & room control, universal compatibility with displays, and audio switching capabilities are also offered. To optimize image quality as well as maintain maximum image brightness and detail, video inputs should be scaled to progressive scanning RGB resolutions that match the “sweet spot” or native resolution of the digital display being used. Using advanced digital video scaling technologies, the unit scales any video input, including any progressive signal, to one of twelve common computer-video, progressive HDTV, or plasma resolutions. RGB inputs are passed through.
5. The specified product provides a total of seven inputs. Six of the inputs are configurable for composite video, S-video, component video, or RGB. Located on the front panel, the seventh input accepts composite video, S-video, or computer-video on a 15-pin HD connector. Also, the unit is able to control and accept signals from a slaved switcher on input #1. Each input accepts audio, and audio attenuation/gain is available.

6. The specified product incorporates the following features.

a. Universal projector control – The specified unit provides universal projector control via downloadable RS-232 or IR drivers, IR learning capabilities, or user-defined RS-232 commands.

b. Remote IR learning capabilities – The specified unit learns and manipulates IR remote control signals. A two row, 16-character LCD guides the user through the IR learning process.

c. Room control – Room lighting, screen settings, and other device functions may be controlled through the specified unit’s room function, via internal relays. Relays may be controlled from the front panel, furnished IR remote, RS-232 control, or optional control pads.

d. Triple-Action Switching™ (RGB delay) – Blanks the screen when the switcher switches to a new source, eliminating visible switching transitions.

e. Balanced/unbalanced audio – Audio gain/attenuation adjustments for each input provided. Audio breakaway available through RS-232 only.

f. Quad-standard video decoding compatibility – The specified unit uses a digital, four-line adaptive comb filter to decode NTSC 3.58, NTSC 4.43, PAL, and SECAM.

g. Inputs – The specified unit accepts any progressive YUV signal, including HDTV 480p and 720p. Six of the inputs are fully configurable for composite video, S-video, component video, or
RGB. Located on the front panel, the seventh configurable input accepts composite video, S-video, or RGB on a 15-pin HD.

h. Scaled outputs – All composite video, S-video, and component video signals are scaled and output simultaneously on a 15-pin HD connector and five BNC’s. The specified unit offers industry standard computer-video output rates: 640 x 480, 800 x 600, 832 x 624, 1024 x 768, and 1280 x 1024. For plasma displays, the specified unit provides plasma output rates: 848 x 480, 852 x 480, 1280 x 768, and 1360 x 765. Also offered are HDTV 480p, 720p, and 1080p output rates.

i. Pass-through outputs – All RGB inputs are passed through and output simultaneously on a 15-pin HD connector and five BNC’s.

j. Picture controls – Horizontal & vertical shift, color, tint, brightness, contrast, detail (image sharpness), and top & bottom vertical blanking adjustments provided. Variable vertical blanking adjustments allow a user to mask noise that occasionally appears at the top and bottom of a processed image or to crop unneeded portions of an image.

k. Executive mode – Locks out all front panel functions except basic switching and control commands; however, all functions available through RS-232 control.

l. High bandwidth – 350 MHz (-3dB) video bandwidth maintains signal integrity.

m. Rack-mountable – Housed in a 2U high, one rack width enclosure. Mounting brackets included for mounting in a rack.

7. Performance Specifications:
   a. Video input
      • Number/signal type:
        – (6) RGBHV/RGBS/RGsB/RsGsBs computer video, component video, S-video, or composite video
(1) RGBHV/RGBS/RGsB/RsGsBs computer video, S-video, or composite video

Connectors

- 6 x 5 BNC female: RGB computer video, component video, S-video, or composite video
- (1) 15-pin HD female: RGB computer video (input 7)
- (1) 4-pin mini-DIN female: S-video (input 7)
- (1) RCA female: Composite video (input 7)

Nominal level:

- Analog — 1.0V p-p
- Minimum/maximum levels: Analog — 0.3-2.0V p-p

Impedance: 75 ohms

Horizontal frequency: 15 kHz to 150 kHz

Vertical frequency: 30 Hz to 150 Hz

Return loss: -30dB @ 5 MHz

Maximum DC offset: 1.5V

b. Video throughput

- Gain: Unity
- Bandwidth: 350 MHz (-3dB)
- Frequency response: < ± 0.1dB @ 30 MHz
- Differential phase error: 0.01°, 0 to 10 MHz
- Differential gain error: 0.01%, 0 to 10 MHz
- Crosstalk: -50dB @ 5 MHz

c. Video output

- Number/signal type: (2) RGBHV/RGBS/RsGsBs*
  computer video (*RsGsBs will be output only if the input is RsGsBs.)

Connectors:
d. **Sync**

- Input type: RGBHV, RGBS, RGsB, RsGsBs
- Output type: RGBHV, RGBS, RGsB, RsGsBs* (*RsGsBs will be output only if the input is RsGsBs.)
- Standards:
  - TTL (RGB)
  - NTSC 3.58, NTSC 4.43, PAL and SECAM (S-video and composite video)
- Input level: 3V to 5V p-p
- Output level: 5V p-p
- Input impedance: 510 ohms
- Output impedance: 75 ohms
- Max input voltage: 5V p-p
- Max. propagation delay: 20 nS
- Polarity: Positive or negative (follows input)

e. **Audio input**

- Number/signal type:
  - (6) stereo, balanced/unbalanced
  - (1) stereo, unbalanced

- Connectors:
  - (6) 3.5 mm captive screw terminals, 5 pole
– (1) 3.5 mm mini stereo jack (unbalanced), or (2) RCA female (white = L, red = R)

• Impedance: 12.5k ohms, balanced, DC coupled; 25k ohms, unbalanced, DC coupled

• Maximum level: +19.5dBu, (balanced or unbalanced) @ stated %THD+N

• Input gain adjustment: -15dB to +9dB, adjustable per input via RS-232 or front panel

f. Audio throughput

• Gain: -15dB (min.) to +9dB (max.) adjustable in 0.5dB increments

• Frequency response: ±0.05dB @ 20 Hz to 20 kHz

• THD + Noise: < 0.03% @ 1 kHz at rated maximum output drive

• S/N: > 90dB, 21dBu output

• Adjacent input crosstalk: > 80dB @ 1 kHz

• Stereo channel separation: > 90dB @ 1 kHz

• CMRR: > 75dB @ 20 Hz to 20 kHz

g. Audio output

• Number/signal type: (1) line-level stereo, balanced/unbalanced

• Connectors: (1) 3.5 mm captive screw terminal, 5 pole

• Nominal output level: +0dBu, unbalanced

• Maximum output level: +6dBu, unbalanced

• Impedance: 50 ohms, unbalanced; 100 ohms, balanced

• Gain error: ±0.1dB channel to channel

• Drive (Hi-Z): > +21dBu, balanced or unbalanced at stated %THD+N

• Drive (600 ohm): > +15dBm, balanced or unbalanced at stated %THD+N
8. Control Specifications:
   a. Remote-Switcher
      • Serial control port: RS-232, 9-pin female D connector, dual port
      • Baud rate and protocol: 9600, 8-bit, 1 stop bit, no parity
      • Serial control pin configurations: 2 = TX, 3 = RX, 5 = GND,
      • Contact closure: (1) 3.5 mm, 10-pole captive screw connector
      • Contact closure pin configurations: 1 = input 1; 2 = input 2;
        3 = input 3; 7 = input 7; 8, 9, 10 = GND
      • Remote keypad control: (2) 3.5mm captive screw connectors, 5 pole
      • Program control:
        – Control program for Windows ®
        – Standardized ASCII command set
   b. Control — room relay
      • Number/type: 2 momentary or latching relays
      • Connectors: (2) 3.5 mm captive screw connectors, 5 pole
      • Contact rating: 24V, 1 A
   c. Control — projector
      • RS-232 projector control port: (1) 3.5 mm captive screw connector, 10 pole
      • IR projector control port: (1) 3.5 mm captive screw connector, 5 pole
   d. Control — peripheral equipment
      • IR Transport connector: (1) 3.5 mm captive screw connector, 5 pole

9. Mechanical Specifications:
a. Power: 100VAC to 240VAC, 50/60 Hz, 60 watts, internal, auto-switchable

b. Temperature/humidity:
   • Storage -40 to +158F (-40 to +70C) / 10% to 90%, non-condensing
   • Operating +32 to +104F (0 to +40C) / 10% to 90%, non-condensing

c. Rack mount: Yes, with included brackets

d. Enclosure type: Metal

e. Enclosure dimensions: 3.5" H x 17" W x 9.5" D (2U high) (front panel is 19" wide)

f. Shipping weight: 17 lbs (7.7 kg)

g. Approvals: UL, CUL, CE

10. The specified unit will be the Extron System 7SC Switcher/Scaler, furnished with IR 70 Remote Control, 50’ Universal Control Cable, 9-pin male-male gender changer, Rackmount Kit, and appropriate IR Emitter (and cable) for projector control (or equal product/s by Inline or Analog Way, if suitably configured).

11. The Selected Firm will install the appropriate IR Emitter at the projector mounting location and employ the IR learning capability of the Switcher/Scaler (or downloaded IR files) to provide front-panel, wired-remote-panel and IR Remote control of selected projector functions. The Selected Firm will coordinate the selection of these functions with the Multimedia Consultant and the University’s Project Coordinator.

12. Unit will also be furnished with (1) Extron SCP 200 (White) Hard-Wired Control Pad (or equal by other manufacturer), which will be custom-mounted by the Selected Firm on the front of the Media Cabinet, to allow access to the Switcher functions and IR port without opening the Media Cabinet doors. The Selected Firm will be responsible for all installation, mounting hardware, cable, and custom fitting or cabinet modifications to
accommodate this Remote. Provisions were not made by the University for mounting this item in the Media Cabinets when they were being designed and constructed, as the product was not available at that time.

13. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.

E. 6-Input VGA + Audio Switcher (one required for Room 223)

1. For Room 223, furnish and install one 6-input VGA Switcher with Audio. This unit will be mounted in the equipment rack section of the Media Cabinets, and will be used to select from multiple additional VGA sources to route to the specified Switcher/Scaler.

2. Note: The VGA Switcher will be connected to the Switcher/Scaler for operation in the “slave” mode. The Selected Firm will provide all additional cables or accessories that may be required for such a mode of operation.

3. The specified product is a six input, one output switcher that switches six VGA computer video and audio sources. Utilizing 15 pin HD connectors, the VGA Switcher allows multiple VGA, SVGA, XGA and VESA computer inputs to be switched to one VGA display and also provides captive screw terminals for balanced and unbalanced audio sources.

4. The Switcher may be controlled via the front panel’s tactile buttons.

5. The rear panel will have a serial port for RS-232 control and a 9-pin connector for contact closure.

6. The specified product incorporates the following features.
   a. Six computer-video and balanced/unbalanced audio inputs
   b. 350 MHz (-3 dB) bandwidth
   c. Auto-switchable
   d. RS-232 and contact closure remote control (9-pin connector)
   e. Simple ASCII command control set
f. Video input/output connectors are female 15-pin HD VGA style

g. Audio input/output connectors are 3.5mm captive screw

h. Capable of switching both balanced and unbalanced stereo audio signals

i. Unselected inputs are 75 ohm terminated

j. Tactile switch buttons with LEDs

k. Adjustable audio gain per input

l. 1U, 17” metal enclosure

m. Internal power supply

7. Performance Specifications:

a. Video

- Input: 0 to 2 volts p-p
- Output: Unity
- Horizontal frequency range: 15-145 kHz
- Vertical frequency range: 30-170 Hz
- RGB video bandwidth: 350 MHz (-3 dB)

b. Audio input

- Type: (6) inputs, stereo balanced or unbalanced
- Connectors: 3.5 mm captive screw terminal, 5 conductor
- Impedance
- Balanced: 25 k ohm, DC coupled
- Unbalanced: 50 k ohm, DC coupled
- Maximum level (balanced or unbalanced): +19.5 dBu
- CMRR: >75 dB 20 Hz to 20 kHz
- Input gain adjustment: -15 dB to +9 dB, adjustable per input

c. Audio throughput

- Routing: 6 x 1 stereo
- Response: + .05 dB 20 kHz to 20 Hz
• Maximum channel gain: 15 dB (input gain at max., balanced output)
• THD+noise: .03% at 1 kHz, .3% at 20 kHz; +15 dBu input, +21 dBu output; Balanced input and output
• S/N: >90 dB, output 21 dBu, balanced
• Adjacent input crosstalk:
  – >65 dB typical at 20 kHz
  – >80 dB typical at 1 kHz
  – >80 dB typical below 60 Hz
• Stereo channel separation: >80 dB at 1 kHz; >60 dB at 20 kHz
d. Audio output
  • Type: 2 outputs, stereo, balanced or unbalanced
  • Connectors: 3.5 mm captive screw terminal, 5 cond.
  • Impedance:
    – Unbalanced: 50 ohms
    – Balanced: 100 ohms
  • Gain:
    – Unbalanced: 0 dB
    – Balanced: +6 dB
  • Gain error: + .1 dB channel to channel
  • Drive (Hi-Z): >+21 dBu, balanced, at stated %THN+N
  • Drive (600 ohm): >+15 dBm, balanced, at stated %THD+N
e. Control Specifications:
  • RS-232/contact closure: 9 pin D-sub female
  • RS-232/protocol: Fixed at 9600 8 bits, 1 stop bit, no parity
8. Mechanical Specifications:
a. Power supply: 100-240 VAC, 50/60 Hz
b. MTBF: 30,000 hrs.
c. Approval: CE, UL & CUL
d. Dimensions: 1.75 ” H x 17 ” W x 9.5 ” D
e. Rack mountable: Yes, with optional rack kit
f. Shipping weight: 8 lbs. (3.63 kg)
g. Enclosure: Metal

9. The specified unit will be the Extron SW6 VGA Audio, furnished with any required accessories for “slave” mode operation and Rackmount Kit (or equal product/s by Inline or Analog Way, if suitably configured).

10. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.

F. Classroom VCR (three required)

1. For Rooms 223, 281 and 283, furnish and install one S-VHS VCR. VCR will be capable of playing both standard VHS tapes and S-VHS tapes. Units will be mounted in the equipment rack section of the Media Cabinets.

2. The product specified incorporates the following features.
   a. Unit will output S-VHS, regardless of source tape format.
   b. Unit must be capable of RS-232 serial remote control for potential future use.
   c. Unit will include a “shuttle/jog” wheel for ease of tape handling and searching.

3. The specified unit will be the JVC SR-S365U, or equal (or current model).

4. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.
G. Classroom Visual Presenter (OPTIONAL ITEM 1)

1. For Room 223, provide a cost to furnish, test and demonstrate one High-Resolution Visual Presenter, with all necessary cables, for classroom use. University will furnish cart and security device, as necessary.

2. The product specified incorporates the following features:
   a. True XGA resolution plus NTSC/PAL video output
   b. 1/3" 850,000 (1,077 x 788) pixels Progressive-scan CCD
   c. Analog RGB (XGA-75Hz) output
   d. Converts the external analog RGB input into video output
   e. 15fps image transfer
   f. High-quality 10x optical zoom
   g. Auto focus
   h. Wireless remote control

3. Performance Specifications:
   a. Input/Output
      • Input selection: 3 modes (Internal/RGB1/RGB2)
      • RGB input: Mini DSUB 15 pin connector female
      • RGB output: Mini DSUB 15 pin connector female
      • C-Video output: RCA Pin jack
      • S-Video output: Mini DIN 4-pin connector
   b. Lighting
      • Upper lighting unit: Built-in, 6W fluorescent lamp x2
      • Baselight: Built-in
   c. Optics
      • Lens: 10x (f=5.8 ~ 58mm) F2.8
      • Shooting area: Max 13.8” x 10.2”
      • Zooming: Powered (with double speed function)
      • Focusing: Auto/Manual
      • Iris: Auto (with level adjustment)/Manual
   d. Other
• RS-232C control terminal: DSUB 9P
• DC output DC 12 V (Max 0.9A)

e. Picture
• Image pick-up element: 1/3” progressive scan CCD
• Total picture element: 1,077(H) x 788(V)
• Effective picture element: 1,024(H) x 768(V)
• Sync. System: Internal
• Horizontal resolution:
  – More than 600 TV lines (RGB output)
  – More than 400 TV lines (Video output)
• Analog RGB output: XGA (1,024 x 768@75Hz), VESA
• C-video output: NTSC/PAL compatible
• S-Video output: NTSC/Pal compatible
• White balance: Full-auto
• Gamma selection: Built-in (1.0/0.6)
• Video output selection: Built-in (NTSC/PAL)
• Flicker correction: Built-in (60/50Hz switch selection)
• Shooting speed: 15 frames/sec.

4. Mechanical Specifications
a. Carrying handle: Built-in
b. Dimensions:
• Set-up: 27.6 x 21.3 x 24.6 in
• Folded: 15.7 x 26.0 x 6.6 in
c. Weight: 22 lbs
d. Power source: AC, 120V, 60Hz
e. Power consumption: 40W

5. The specified unit will be the Elmo HV-5000XG, or equal. Note that “equal” products must have a minimum of 1024x768 graphics output resolution and a “frame rate” of no less than 15 fps.
6. The unit will be furnished with a suitable 15’ VGA Cable, for connection to the separate Computer Interface Panel or the front-panel RGB input of the Switcher/Scaler.

7. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.

H. Classroom Broadband Cable Tuner (five required)

1. For Rooms 223, 281, and 283, furnish and install one Broadband Cable AM/FM/TV/Weather Radio Tuner, for connection to the Video Switcher/Scaler as a signal source. The University will provide the Broadband Cable feed.

2. For Rooms 175 and 187, furnish and retrofit/install one each. Broadband Cable tuner, as specified herein, into the existing systems. Network connections are not required at this time, as Rooms 175 and 187 do not currently have an existing multimedia control system installed. The units will be operated manually from the front panel.

3. The specified unit is a control-network-optimized high-performance AM/FM/TV and Weather Radio tuner. The control-network system can store virtually unlimited radio station and television (TV) channel presets. The presets are available for recall through remote-keypads, remote control devices, and/or touchpanels. The frequency of the radio station or TV channel being received is displayed on the specified unit and can also be displayed on a suitable touchpanel. The specified unit also receives monophonic (mono) AM broadcasts, stereo or mono FM and mono Weather Radio broadcasts. The TV band provides reception of channels 1 to 125. The video may be connected to video inputs, switching devices and/or to any commercial TVs or monitors that have composite video input connectors.
4. The specified unit will be fully operable from front-panel controls, without the need for a remote-control system.

5. Performance Specifications:
   a. AM Tuner Specifications
      - Sensitivity: 55µV
      - Alternate Channel Selectivity: 55dB
      - Image Rejection: 35dB
      - IF Rejection: 60dB
      - Output Level, Line @ 10k ohms AM/FM: 1VRMS
   b. FM Tuner Specifications
      - Input Connector (‘F’ Type Coaxial): 75 ohms
      - Usable Sensitivity, Mono: 11 (dBf)
      - Signal to Noise Radio@65 dBf, mono/stereo:
      - 74dB/70dB
      - Selectivity, Adjacent / Alternate Channel:
      - 5dB/65dB
      - IF Rejection: 100dB
      - AM Rejection: 55dB
      - Stereo Separation: 45dB
      - THD @1KHz mono/stereo (%): 0.05
   c. Radio Data Systems (RDS)
      - Purely Digital RDS, FM encoded
      - Data available to control system
   d. TV Tuner Specifications
      - Input Connector: (“F” Type Coaxial): 75 ohms
      - Frequency Range: 55 to 802MHz
      - Off air TV Channels: 2 to 69
      - CATV Cable Channels: 2 to 125
      - Stereo Separation: 35dB
• THD @1Khz L+R (%): 0.2
• Sensitivity: –20 to +20dBmV
• Video Level @75 ohms: 1VRMS
• Output Level, Line @10k ohms: 1VRMS
• SAP: Secondary Audio Program

e. NOAA Radio Specifications
• Input Connector: (TV “F” Type Coaxial): 75 ohms
• Frequency: 162MHz
• THD @1KHz L+R (%): 0.2
• Sensitivity (mono only): -20 to +20 dBmV
• Output Level, Line @ 10k ohms: 1VRMS

6. Mechanical Specifications:
a. Indicators
• PWR: Indicates power supplied to the unit
• NET: Indicates communications between the system and specified unit
• SIG: Display indicates strength of incoming signal
• MONO: Indicates that mono output is activated in FM band
• SAP: Indicates that secondary audio program selector is activated
• PRE: Indicates that manual preset mode is activated
• TUNE: Indicates that manual tuning mode is activated
• SRCH: Indicates that manual search mode is activated
• AM: Indicates unit is set for AM reception
• FM: Indicates unit is set for FM reception
• WX: Indicates unit is set for weather radio reception
• TV: Indicates unit is set for TV reception

b. Buttons
• TUNING: Tunes signal up or down
• BAND: Selects either AM, FM, weather radio, or TV
• MONO: Selects mono output in FM band
• MODE: Selects either local preset, manual tuning, or search mode
c. Connectors
• 12VDC .5A: Power socket connector used to supply power via an external AC power pack
• NET: (2) 6-position RJ11 modular jacks are pass-through connectors that are also used to connect the unit to the control system
• AUDIO (L+R): (1) RCA jack pair; audio outputs
• VIDEO: RCA jack; video output
• AM: 2-position connector; connects to AM antenna
• FM: F coaxial cable; connects to FM antenna
• TV: F coaxial cable; connects to TV antenna
d. Power Requirements: 24VDC, 170 mA; network power
e. Dimensions: 1.70"/4.23cm (H) x 7.07"/17.95cm (W) x 6.32"/16.06cm (D)
f. Weight: 2.3lbs./1.05kg
7. The specified unit will be the Crestron ST-TUNE, or equal. The unit will be connected to the specified Multimedia Controller, for remote monitoring or operation, as required. Units not capable of interfacing to the Multimedia Controller, with complete control and monitoring functionality, will not be acceptable.
8. The unit will be furnished with suitable “cable” or “wire”-style antennas for AM and FM reception. These antennas will be of basic design, with no special gain circuitry, and will be mounted to the interior of the Media Cabinets, as appropriate. High-performance is neither requested nor required.
9. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.

III. Video Wire and Cable

A. Video wiring, RGB, NTSC, S-VHS, or other, will be run using specifically designed High-Resolution Cables. The use of multi-core cables is encouraged wherever practical. For this project, the use of Plenum-Rated cable is required.

Suggested cable manufacturers will include Extron, Inline, and Covid. Other manufacturers products will be acceptable if they meet the performance criteria of “High-Resolution Coax Cables,” as exemplified by the products from the manufacturers noted herein.

B. All conduits used by the Selected Firm will be left with a pull-string installed.

C. All cable “home runs” must be continuous, with no splices.

IV. Video System Installation

A. General

1. Video System Installation will comply with all provisions of Attachment 3a, Sound Systems, Section VIII, Sound System Installation, Sections A, B, and C, substituting “video” for “sound” where applicable.

2. Wherever possible, within the scope of the hardware proposed, if a choice exists between using the S-Video or Composite Video outputs of a signal device, preference will be given to S-Video.

3. All video signal lines will be properly terminated, as required by the equipment involved.
4. The Selected Firm must furnish all portable cables required for full and complete operation of systems.

5. The Selected Firm will label all devices, panels, jacks, and controls as to their functionality. Labels will be internal (insert labels for buttons, and similar), directly engraved, silk-screened, or engraved on Lamacoid-type permanent-adhesive labels. The Selected Firm will coordinate the labeling, choice of names or icons, and placement with the Multimedia Consultant and the Project Coordinator for ITC. No labels will be applied or finalized without signed approval by the University’s Project Coordinator, or their designated representative. It is the desire of the University to keep the naming or identification of devices, jacks, and controls as intuitive and simple as possible.

The use of “tape” style labels will not be acceptable for this project.

V. Proof-of-Performance and Testing

A. For Items “B,” “C,” and “D” that follow, the Selected Firm will be responsible for performing all of the required tests, on all of the equipment in the systems.

B. The Selected Firm will, in the presence of the Multimedia Consultant, University’s agent and/or any designated representatives of University, demonstrate all items of the video systems herein specified, showing them to be fully functional and capable of performing the tasks required. A checklist will be completed and initialized by University and the Multimedia Consultant certifying acceptance or rejection of performance, for each item.

C. Proper signal levels from all designated or furnished signal sources will be verified using suitable Test Equipment and/or test source material. The Selected Firm will furnish all test equipment and/or test signal sources required. Test Signals covering the entire spectrum of expected usage (resolutions, scan rates,
etc.) will be sent to the Video Projector to verify proper operation, registration and color setup. A checklist will be completed and initialized by University and the Multimedia Consultant certifying acceptance or rejection of performance, for each item, with each signal type.

D. All tests will be performed in the presence of the Multimedia Consultant and University’s agent, or designated representatives of University. Any equipment that does not meet specified performance criteria will be corrected or adjusted on-site if possible to establish compliance. Equipment that cannot be made to perform according to specification will be removed and replaced by the Selected Firm at no additional charge to University.
Attachment 5c
Audio-Visual Equipment

I. Scope

A. Description
1. This section includes all Audio-Visual Equipment, not otherwise specified in Attachments 5a and 5b. Included in this section will be a Projection Screen, a Wireless Keyboard for use with University-furnished computers, a Standard Overhead Projector, System Remote AC Turn-On & Surge Suppressor, and a Wireless Mouse w/Y-Mouse Adapter as noted in the specifications and on the Drawings.
2. Peripheral Equipment and Accessories, as noted in the specifications and on the Drawings.
3. The Selected Firm is responsible for furnishing fully operational systems to University on completion of this project. Items not specifically listed in this section, but required for proper operation of the systems herein described, will be the responsibility of the Selected Firm to provide as part of the package.

B. Performance Criteria
The Audio-Visual Equipment herein specified is a basic guideline, indicating minimum required functionality and performance criteria. Firms must satisfy the fit, form, and function of the basic designs, but may present viable alternative approaches as their primary bid. Such presentations must be accompanied by a complete proposed Bill of Materials (all major items), and System Risers and/or line drawings indicating system connectivity, and verification that all basic design criteria are being satisfied.

C. Work By Others
Certain provisions have been made for conduit, junction boxes, furniture cutouts, and AC power in the existing General Construction Contract. It will be the
responsibility of all firms to review these provisions thoroughly. Any additional work, either conduit, cutting, patching, etc. necessary to install the firm’s proposed system, and return an area to it’s current finished state, will be the sole responsibility of the firm, and will be included in their price.

II. Standard Classroom Audio-Visual Equipment

A. Projection Screens (three required)

1. For Rooms 223, 281, and 283, furnish and install one Wall-mounted Manual Projection Screen. Screens will nominally be wall-mounted, as high as possible. Final mounting will be as approved by Multimedia Consultant and University Architect.

2. The product specified incorporates the following features.

   a. Screen will be furnished in AV Format. The specified unit will include a viewing area of 96” H. x 120” W. (Note: The Multimedia Consultant and the University are aware that under normal use there “may” be a white border on either side of the projected image. The screen size specified is to allow for ease in accommodating the future HDTV screen format.)

   b. Case of 22 ga. steel, flat back design, with embossed, baked-on Plastisol finish in gray (standard) or white (optional).

   c. 16 ga. endcaps finished to match case, with integral roller brackets, concealing roller ends. Furnished with matching universal mounting brackets.

   d. Viewing surface of Matte-White fabric (or equal), mounted to one-piece rigid steel roller with FabrikLok spline/groove construction to prevent separation of fabric from roller. Viewing surface flame and mildew resistant. Bottom of viewing surface securely mounted on tubular steel slat, with ends protected by vinyl caps.
3. The specified unit will be a Draper Model Luma 2, AV Format (96” x 120”), with Matte-White viewing surface, and will include all necessary mounting hardware.

4. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product. Alternate manufacturers “may” include Stewart and DaLite, providing the above requirements are met.

B. Wireless Keyboards (three required)

1. For Rooms 223, 281, and 283, furnish one Wireless Computer Keyboard, to be used with University-furnished computers. Furnish one Apple Macintosh Adapter with each Keyboard package.

2. The product specified incorporates the following features.
   a. Communication Radio frequency technology
   b. 50 foot operating range
   c. 4 switch-selectable channels for multi-unit installations
   d. 49mHz frequency
   e. Keyboard Durable and compact with 83 full-size keys
   f. Embedded numeric keypad for 101 key compatibility
   g. 100 hours operation (nominal) on 4 AA alkaline batteries (included)
   h. Works with standard AT keyboard driver
   i. Keyboard dimensions 17.3 x 6.3 inches
   j. Mouse Touchpad Fingertip-controlled movement and clicking
   k. Left and right mouse buttons
   l. Works with standard mouse drivers
   m. Receiver Integral 5 foot cable with keyboard and mouse connectors
   n. 5-pin keyboard and 9-pin serial adapters
   o. Game port cable
p. Receiver dimensions 4.6 by 6.3 inches

3. The specified unit will be the Wireless Surfboard, as manufactured by Wireless Computing, Inc., with the Apple Macintosh Adapter included.

4. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.

C. Wireless Mouse w/ Y-Mouse Keyboard/Mouse Adapter

1. Furnish one Wireless Mouse System with Y-Mouse Keyboard/Mouse Adapter, to be used with University-furnished computers.

2. The Wireless Mouse will use the existing mouse driver - Microsoft, Logitech, Apple Macintosh, or Power PC.

3. The Y-Mouse product will be for PC use, not Apple. This unit will allow the wireless keyboard and the wireless mouse to share a common laptop or desktop PS/2 port.

4. The wireless mouse product specified incorporates the following features:
   a. Wireless design
   b. Revolutionary gyroscopes
   c. Natural gestural control
   d. RF multi-channel radio
   e. No software drivers required
   f. PC, PS/2 and Mac
   g. Two AA batteries

5. The specified unit will be the GyroPoint Pro II, as manufactured by ixmicro, Inc. and the Y-Mouse product will be the Keyboard/Mouse Adapter, as manufactured by P.I. Engineering, Inc.

6. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.
D. Remote AC Turn-On System & Surge Suppressor (1 each required)

1. Furnish and install one Remote AC Turn-On System (custom or pre-manufactured), to be mounted internal to the Media Cabinets, with an external On/Off control and power indicator. Furnish one Series-Mode Surge Suppressor for internal use in the Media Cabinet. These systems will power on or off equipment in the Media Cabinet, and protect sensitive electronics from power transients, as determined in consultation with ITC and the Multimedia Consultant.

2. Equipment will be powered up and down in a manner that does not introduce loud transients or damaging spikes in any of the equipment.

3. The Selected Firm will provide all internal AC wiring strips or outlet devices (UL or approved testing lab certification required), as required by the equipment complement furnished. The University will provide the 120 VAC circuits internal to the Media Cabinet, as 20 A. duplex receptacles, for use by the Selected Firm.

4. The specified Series-Mode Surge Suppressor will be the Surge-X Model SX20-iR2, or alternate choice from the Surge-X product line. The Remote AC Turn-On System may be combined with the Surge Suppressor through the use of the Surge-X SX2120-SEQ, at the discretion of the Selected Firm. The use of Shunt-Mode Surge Suppressors will not be acceptable.

E. Standard Overhead Projector (three required)

1. For Rooms 223, 281, and 283, furnish one Standard Overhead Projector with lamp-changer. University will furnish cart and security device.

2. The product specified incorporates the following features:
   a. Approx. 1700 Lumen output, or greater
   b. 10.5” x 10.5” stage
   c. Lamp Changer feature
   d. Variable-focus lens, 12.2”-14.2”
      Note: Long-throw capability (14” focal-length or greater, required)
   e. All-metal design.
3. The specified unit will be an Eiki Model 3890 Stationary Overhead Projector (or current model, if applicable), or equal.

4. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product. Alternate manufacturers “may” include Buhl, Dukane, Elmo, or 3M, providing the above requirements are met.

III. Audio-Visual Equipment Installation

A. General

1. The Selected Firm will be responsible for installation of the Projection Screens in all classrooms. Multimedia Consultant and Architect will approve exact location, mounting method, and mounting height prior to final installation. Locations are as shown on the University’s General Contract drawings.

2. The Wireless Keyboard, Wireless Mouse, Y-Mouse Adapter and Overhead Projector are “furnish-only” items, and will be delivered to the designated ITC representative. They will, however, be subject to the “Proof-Of-Performance” testing, as noted below.

3. The Selected Firm will label all devices, panels, jacks, and controls as to their functionality. Labels will be internal (insert labels for buttons, and similar), directly engraved, silk-screened, or engraved on Lamacoid-type permanent-adhesive labels. The Selected Firm will coordinate the labeling, choice of names or icons, and placement with the Multimedia Consultant and the Project Coordinator for ITC. No labels will be applied or finalized without signed approval by the University’s Project Coordinator, or their designated representative. It is the desire of the University to keep the naming or identification of devices, jacks, and controls as intuitive and simple as possible.
The use of “tape” style labels will not be acceptable for this project.

IV. Proof-of-Performance and Testing

A. For Items “B,” “C” and “D” that follow, the Selected Firm will be responsible for performing all of the required tests, on all of the equipment furnished.

B. The Selected Firm will, in the presence of the Multimedia Consultant, University’s agent and/or any designated representatives of University, demonstrate all equipment items herein specified, showing them to be fully functional and capable of performing the tasks required. A checklist will be completed and initialized by University and the Multimedia Consultant certifying acceptance or rejection of performance, for each item.

C. All tests will be performed in the presence of the Multimedia Consultant and University’s agent, or designated representatives of University. Any equipment that does not meet specified performance criteria will be corrected or adjusted on-site if possible to establish compliance. Equipment that cannot be made to perform according to specification will be removed and replaced by the Selected Firm at no additional charge to University.

D. The Wireless Keyboard, Wireless Mouse, and Y-Mouse Adapter are “as requested by the University ITC staff.” Units will be shown to be operational, but compatibility with University-furnished computers will be the responsibility of ITC, and not the Selected Firm.
I. Scope

A. Description

1. This section includes all Multimedia Control Systems equipment. Included in this section will be a System Controller, Ethernet interface (OPTIONAL), Control Panels (where specified), and Interface Units or Modules (as required) in the quantities as noted in the specifications and on the Drawings.

2. It is the intent of this section to provide, or provide the capability for, LAN or WAN (or Internet, if selected at some point in the future) access to key elements of the Sound, Video, and Audio-Visual Systems described elsewhere in this document. Such access will include remote control (for operational or Help Desk applications), system diagnostics (if applicable) and preventive maintenance information. TCP/IP will be used as the communications protocol across the network, and standard Web Browsers will be the means of accessing the GUI (Graphic User Interface).

3. Peripheral Equipment and Accessories, as noted in the specifications and on the Drawings.

4. The Selected Firm is responsible for furnishing fully operational systems to University on completion of this project. Items not specifically listed in this section, but required for proper operation of the systems herein described, will be the responsibility of the Selected Firm to provide as part of the package.

B. Performance Criteria

The Multimedia Control Systems herein specified are basic guidelines, indicating minimum required functionality and performance criteria. Firms must satisfy the fit, form, and function of the basic designs, but may present viable alternative
approaches as their primary bid. Such presentations must be accompanied by a complete proposed Bill of Materials (all major items), and System Risers and/or line drawings indicating system connectivity, and verification that all basic design criteria are being satisfied.

The means of implementing the “TCP/IP-based Network Control” portion of this section will be considered of primary importance - not only in terms of the ease and capabilities of the system implementation and operation, but also in terms of the robustness, flexibility, and expandability of the proposed methodology and hardware - as it may form the core of a new “support mechanism” employed by ITC. Consideration will be given to additional “support documentation” which may be included by firms submitting proposals, that may include written references for the proposed system, suggested long-range plans of development, or any other additional information the firm may wish to submit to the University in this regard.

C. Work By Others
Certain provisions have been made for conduit, junction boxes, furniture cutouts, and AC power in the existing University Renovation Work. It will be the responsibility of all firms to review these provisions thoroughly. Of specific note should be that the various wall and cabinet-mounted junction boxes and conduit runs are being furnished and installed by the University, and are as noted on those drawings and specifications. Any additional work, either conduit, cutting, patching, etc. necessary to install the firm’s proposed system, and return an area to it’s current finished state, will be the sole responsibility of the firm, and will be included in their price.

II. Multimedia Control System Equipment

A. Integrated Controller (three required)
1. For Rooms 223, 281, and 283, furnish and install one Integrated Multimedia Controller. This unit will be mounted in the equipment rack section of the Media Cabinets, and will be used to access, monitor, and/or control other designated hardware in the rack or classroom.

2. The specified product will be a high performance, integrated control system with dynamic expansion capabilities.

3. An LCD control center and LED indicators will provide access to virtually all system functions - without using a PC. System status, COM port status and card slot functions will all monitored from the front panel.

4. DPA (Direct Processor Access) (or as furnished by the proposed product) will provide a direct link to any LAN or Internet connection via Ethernet. The DPA card slot (or as furnished by the proposed product) will accommodate 10BaseT, 100BaseT and future communication protocols like ATM and Firewire. Each control system will have its own user-assigned IP address, seamlessly integrating with a computer network.

5. The specified product incorporates the following features.
   a. Utilize a real time, event driven, multi-tasking, multi-threaded operating system with a distributed processing architecture.
   b. Support internal high-speed data communications port with Direct Processor Access (DPA) (or as furnished by the proposed product).
   c. Support 10BaseT Ethernet communications with DPA communication and future 100BaseT Ethernet, ATM, Firewire communications.
   d. Support TCP/IP and SNMP communications with Direct Processor Access (or as furnished by the proposed product) (communication through control system bus link will not be accepted).
   e. Support user assigned IP address.
   f. 100% compatible with all PC, Mac, Unix, etc LANs.
   g. Full API (Applications Interface) directly to control system via TCP/IP for integration with Visual Basic, C++, Java, etc.
applications. API support through included ActiveX module and/or Dynamic Link Library (.DLL).

h. 2 line by 40-character front panel LCD communication center (or as furnished by the proposed product). Display will provide the following information without the use of a computer:
   • View control program (name, date, creator).
   • Manually control any function (I/O, relays, etc).
   • Report network devices.
   • Report error messages.
   • User definable functions – program LCD menu with dealer name, telephone number, control functions (use like a touch panel).

i. Front panel LED display panel for status indication of every port and card slot.

j. Network Analyzer to continuously monitor the integrity of the network for wiring faults, marginal communication performance, and network errors – all information is viewable.

k. Integrated three-slot card cage to support any mix of control cards for IR, RS-232/422/485, relay, digital I/O, analog input, volume, MIDI.

l. Internal power supply.

m. Front and rear programming ports.

n. Support RS-485 token passing local area network (LAN) with data communication for a minimum distance of 5000 feet.

o. Support a minimum of 253 LAN devices simultaneously.

p. Control system will support object-oriented logic based programming language or a C-like language programming language or both. If available, both programming types are to be supported to run simultaneously and integral to each other.
q. Control system manufacture will supply Windows-based graphical programming software for drag and drop object oriented programming for the control system operation.

r. Control system manufacture will provide Windows-based graphical programming software, which is self-documenting in that it generates a symbolic flow diagram printout from the system program.

6. Functional / Mechanical Specifications:
   a. Connectors (or as furnished by the proposed product)
      • NET: (1) 6-wire RJ-type connector and (1) 4-pin male connector; for expansion to network peripherals; 50W maximum load depending on expansion slot load
      • RELAYS: Furnishes (8) normally open, isolated relays; each relay is rated 1A, 30VAC/DC; MOV arc suppression across contacts for use with “real world” loads
      • INPUT/OUPUT: Furnishes (8) programmable analog inputs and digital inputs/outputs; digital outputs offer 250mA sync from maximum 24VDC; catch diodes for use with “real world” loads; digital inputs rated for 0-24 VDC, 20K ohms input impedance, logic threshold 1.25VDC; analog inputs rated 0-10VDC, protected to 24VDC maximum, 20K ohms input impedance; programmable 2K ohms pullup resistor (per pin, software reference to GND or closure to GND)
      • IR/SERIAL: Furnishes (8) serial outputs for (IR), RS-232 or serial interface; signal (S) and ground (G) pins; infrared output up to 1.2MHz
      • COM: Furnishes (6) bidirectional serial ports for RS-232, RS-422 or RS-485 communication with hardware and software handshaking; speeds up to 230,400 bps
• COMPUTER: (2) one per front and rear panel, 9-pin DB9 female connector for programming with a PC; modem compatible; not included

• Expansion Slots
  – DPA: Direct Processor Access expansion slot for optional local area network (LAN) interface card (or as provided for by proposed product); supports 10BaseT Ethernet card; may require field installation and has (1) 8-wire RJ45 connector for communication access
  – Other (1-3): (3) open “card cage” slots accept any network-interfaceable control cards

b. Indicators (or as furnished by the proposed product)
• PWR: Indicates power supplied to the unit
• NET: Indicates activity within the system
• ERR: Indicates an error message is available from the software feature buttons
• TXD (Ethernet): Indicates transmission of Ethernet data
• RXD (Ethernet): Indicates reception of Ethernet data
• LNK (Ethernet): Indicates attachment to Ethernet network
• ERR (Ethernet): Indicates Ethernet protocol error
• COM TX (A-F): Indicates transmission of data to serial devices attached to respective COM ports
• COM RX (A-F): Indicates reception of data from serial devices attached to respective COM ports
• COM RTS (A-F): Indicates when unit is ready to receive data from serial devices attached to respective COM ports
• COM CTS (A-F): Indicates when serial device on the respective COM port is ready to accept data from the unit
• IR-SERIAL (A-H): Indicates activity on respective IR/SERIAL line
• INPUT-OUTPUT (1-8): Indicates input voltage threshold for respective I/O port exceeded
• RELAY (1-8): Indicates respective relay is closed
• SLOT (1-3): Illuminates when card is inserted into slot; flashes when card is active
c. Fully programmable front panel "soft key" buttons (or as furnished by the proposed product)
d. Reset Buttons (or as furnished by the proposed product)
  • HW-R: Permits physical reset of system
  • SW-R: Restarts control program
e. Screen (or as furnished by the proposed product)
  • (1) Reverse mode (yellow and black) LCD back light; (2) lines (or as furnished by the proposed product)
  • (40) Characters per line (or as furnished by the proposed product)
f. Menu Function Buttons (or as furnished by the proposed product)
  • PANEL: Programmable interface offering command text, indirect text, and hierarchical screen structure
  • INFO: Displays system information including the loaded control program
  • MSG: Displays system alarms and error messages
  • TIME: Permits alterations to system date and time; access code required
  • COM: Monitors the transmission and reception traffic on each COM port
g. Menu Selection Buttons (or as furnished by the proposed product)
  • MENU: Returns screen display to menu default state
  • ^: Advances the current screen display
• V: Returns the current screen display to its previous state
• BKLT: Alters screen and LCD brightness

h. Power Requirements (or as required by the proposed product)
• 100-250VAC, 2.3A, 50/60Hz, internal universal power supply

i. Dimensions (or as defined by the proposed product)
• 3.47” / 8.81cm (H) x 19.00” / 48.26cm (W) x 8.43” / 21.41cm (D)

j. Weight (or as defined by the proposed product)
• 7.01lbs / 3.18kg

7. Additional Performance Specifications

a. The control system will support a variety of wireless communication modes, including one-way and two-way radio frequency and infrared transmission.

b. The control system will not require internal switch settings, jumpers, or adjustments. All circuit boards and modules must be directly replaceable without the need for pre-placement setup. Hardware parameters will be set and defined by software parameters in the system program. Circuit boards and modules requiring switch settings, jumper settings, or adjustments will not be accepted.

c. User connections to the control system will be clearly labeled as to function (relay, analog, volume controls, etc.), as well as information on connections such as +, -, and G. Array of numbers or letters that do not convey specific information will not be accepted.

d. The control system will support expansion enclosures or card cages, which may be located anywhere on the system network.

e. The control system manufacture will be capable of providing slide projector, motor control, power control, light dimming, RS-232,
infrared, pan/tilt, camera lens, analog inputs, digital inputs, and
digital output interfaces that operate directly from the network.

f. The control system will use centralized software. Information
required to interface with the various controlled equipment will be
stored in the control systems central processing computer and
downloaded to the appropriate control hardware. Control systems
requiring EPROM changes or special factory programming are not
accepted.

g. The control system manufacture will provide programming
diagnostic software that indicates the program flow in real time as
the system is being operated. This software will permit the
isolation of specific program events for analysis.

h. The control system manufacture will provide end-user software
based on menus and windows, which permit programming and
editing of multiple real-time sequences. The control system
includes a virtual tape recorder, which stores system functions in
non-volatile memory. Sequences of functions are automatically
recorded as they occur and may be played back causing functions
to be activated in the same time sequence as they occurred.
Sequences may be edited in non-real time and then played back.

i. The control system manufacture will provide end-user software for
event scheduling. Functions or sequences of functions may be
programmed to occur based on calendar dates, weekly, or monthly
cycles.

j. The control system will include indicators, which signify system
errors, power supply failure, and overload.

8. The specified unit will be the Crestron CNMSX-PRO, or equal.

9. Acceptable “equals” will include comparable products from other
manufacturers that either meet or exceed the intent of these specifications.
Any substitutions must meet the fit, form, and function of the specified product.

B. Ethernet Card for Integrated Controller (OPTIONAL ITEM 2)

1. Provide a Per-Classroom Unit Cost to furnish and install one 10Base-T Ethernet Card in the Integrated Multimedia Controller, for connection to the University LAN/WAN. The University will furnish data port or cable (RJ-45) connected to the University network, for use by the Selected Firm.

2. The specified product incorporates the following features.
   a. The Ethernet Card provides communication via LAN/WAN or Ethernet to any network control device via industry standard Internet Protocol. The Ethernet Card allows remote diagnostics and upgrades and access to the control system’s network analyzer, as well as the opening of TCP/IP sockets to communicate with other Ethernet-based systems, and the ability to activate any device connected to the system.
   b. The specified Ethernet Card is upgradeable in the field and connects directly to the Direct Processor Access (DPA) slot (or as provided by the proposed product) to provide direct, high-speed access from any controlled system device to the system processor.
   c. The specified Ethernet Card also contains a 2MB file system that is used as a Web Server. The Selected Firm (or the University -post Warranty) will use the manufacturer’s Control Panel/HTML software, or most any third-party HTML package (Microsoft® FrontPage™, Adobe® PageMill™, etc.) to create Java powered HTML pages. These pages can be stored onboard the Ethernet Card Web Server. Then, up to five users can simultaneously connect directly to the control system via most popular web browsers.
   d. The specified Ethernet Card eliminates the need for a dedicated PC or software licensing, and hosts the graphical user interface.
securely inside the card. Moreover, all memory resources are maintained within the control system, resulting in no additional network overhead.

e. The specified Ethernet Card will support the following communications protocols:
   • TCP/IP communications
   • UDP/IP communications
   • Telnet communications
   • 10BaseT Ethernet interfaces

f. The Ethernet Card will incorporate an On-board RISC processor, to minimize processing overhead in the Integrated Controller.

g. The Ethernet Card will incorporate built-in security, as well as being able to take full advantage of any LAN-based security systems as implemented by the University.

3. Proposed Ethernet Card Systems that do not incorporate an integral Web Server capability, will require that the Multimedia Control System be furnished with any additional external hardware or licensing required to duplicate such features or capabilities, at no additional cost to the University. The use of Client-Side systems, and Distributed Architecture is recommended, but consideration will be given to all proposed systems, if suitably presented and documented.

4. The specified unit will be the Crestron CNX-ENET+, or equal.

5. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.

C. Wireless Control Panel and Receiver (three required)

1. For Rooms 223, 281, and 283, furnish, program, and demonstrate one Wireless Touchscreen Controller with color display, rechargeable
batteries, and charging station. Each Wireless Touchscreen Controller will be furnished with a corresponding Wireless Receiver, suitable for connection to the Multimedia Controller network.

2. The specified Wireless Touchscreen Controller incorporates the following features.
   a. High-clarity LCD, 6" diagonal color Touchscreen display.
   b. Display technology will provide clear, easy-to-read graphics - even in the brightest ambient light.
   c. Touchscreen power options include rechargeable NiCad power pack or AC power supply.
   d. 320 x 240 resolution with a minimum size of 4.70" X 3.55".
   e. 256 Color (STN) Dot Matrix display.
   f. RF wireless one-way communication.
   g. Use of power pack slow charges installed batteries.
   h. Support an infinite number of user definable pop-up menus designed in a Windows software package.
   i. Display 3-D buttons with animated feedback.
   j. Support a minimum of 26 scalable and TrueType fonts.
   k. Support a minimum of 999 discrete button channels.

3. Wireless Touchscreen Controller Technical Specifications:
   a. Touchpanel will use high resolution liquid crystal display technology with a minimum pixel resolution of 320 X 240, and a minimum size of 4.70" X 3.55". Lower resolution or smaller size displays will not be accepted.
   b. Touchpanel will display a minimum of 256 colors.
   c. Touchpanel will display up to 256 color bit map graphics with dithering.
   d. Touchpanel will (one-way) communicate with control system via RF signals operating at 434 MHz (other frequencies available upon request). The control system and touchpanel will support the
uploading of all panel programming and display configuration over the four wire RS-485 Token Passing Local Area Network (LAN).

e. Touchpanel will slow-charge installed batteries when external DC power pack or network connection is made.

f. Touchpanel will utilize 12 VDC power. Touchpanels requiring the use of a local wired power source will not be accepted.

g. Touchpanel will support no less than 96 screens and 999 button functions. Touchpanel that supports less than 999 discrete button channels will not be accepted.

h. Touchpanel will support an infinite number of user definable pop-up menus. Pop-up menus will be designed in a graphical based software package. Systems limited to a predefined set of pop-up menus or systems requiring non-graphical design of pop-up menus will not be accepted.

i. Touchpanel will support a minimum of 26 scalable and TrueType fonts. Touchpanels limited to manufacturers defined fonts will not be accepted.

j. Touchpanel will support user definable compression of graphics.

k. Touchpanel will be provided with design software that is Windows-based and supports multiple projects open simultaneously, enabling true drag and drop project creation.

4. The specified Wireless Receiver incorporates the following features:

a. Unit will incorporate crystal-locked tuning.

b. The radio-frequency (RF) code packets will include error correction for high reliability reception.

c. The unit receives RF signals from one or more transmitters and translates them into commands for transmission over the multimedia control network.

5. Wireless Receiver Technical Specifications:

a. Radio Frequency (RF): 1-way; 434MHz
b. Communications Ports:
   • NET: (1) 4-pin male connector; to control network

c. LED Indicators
   • SIGNAL: Indicates reception of valid RF signal
   • ID SELECT: Indicates established communication between unit and network control system
   • NET PWR: Indicates 24VAC power supplied from control network

d. Enclosure: Black metal

e. Power Requirements: 24VDC network power

f. Dimensions: 7.28" / 18.49cm (H) x 3.25" / 8.25cm (W) x 1.35" / 3.44cm (D)

g. Antenna Length: 7.90" / 20.1cm

h. Weight: 1.1lbs / 0.5kg

6. The specified Wireless Touchscreen Controller will be the Crestron ST-1550C, furnished standard with ST-DS Docking Station/Charger and ST-BTP Battery Pack, or equal.

7. The specified compatible Wireless Receiver will be the Crestron CNRFGWA, or equal.

8. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.

D. Volume/Tone Control Card (three required)

1. For Rooms 223, 281, and 283, furnish and install one three-channel digital volume and tone controller into the Integrated Multimedia Controller, using one of the available open “card slots”.

2. The Volume/Tone Control channels will be inserted in the audio system signal path as noted on the drawings. The Selected Firm will be
responsible for all wiring, connections, and interfaces (if required) to incorporate the designated channels into the Audio System signal path.

3. The specified Volume/Tone Control Card incorporates the following features:
   a. The Volume/Tone Control Card provides volume/tone control interface with one stereo and one mono or three independent mono channels.
   b. The card is a circuit board fastened to an aluminum faceplate. The card is manufactured to easily fit into an unoccupied slot in the specified Integrated Multimedia Controller.
   c. The faceplate contains three identical male, 6-pin connectors, A, B, and C. Each connector provides balance/unbalance input and output ports as well as chassis ground. Silk screening is applied to the faceplate. Three supplied 6-position connectors can be wired and attached to connectors, A, B, and C.

4. Volume/Tone Control Card Technical Specifications:
   a. Volume Specifications of the Card (Per Channel)
      • Input Impedance: 10K or 600 Ohms
      • Output Impedance: 10 Ohms
      • Input: Balanced or Unbalanced
      • Output: Balanced or Unbalanced
      • Total Harmonic Distortion (THD): -90 dB
      • Hum and Noise (ref. 0 Dbv): -90 dB
      • Maximum Input Level (Flat Mode): 3.5V rms
      • Channel Separation: -90 dB
      • Attenuation Range (Excluding Mute): 0 to -76 dB (maximum)
      • Mute: -104 dB
      • Frequency Response: 8 Hz to 60 KHz (-3 dB minimum)
   b. Tone Specifications of the Card (Per Channel)
• Flatness (8 Hz to 60 KHz flat mode): +/- 0.2 dB
• Bass Gain Range (100 Hz): +/- 12 dB
• Bass Step Size (100 Hz): 2 dB
• Treble Gain Range (10 KHz): +/- 12 dB
• Treble Step Size (10 KHz): 2 dB

5. The specified unit will be the Crestron CNXVTC-3, or equal.
6. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.

E. Connection to External Devices
1. The Multimedia Control System will communicate directly over its own internal network to any other Control Panels, Interface Units or Modules, as may be specified elsewhere in this document as required to be connected to the Multimedia Controller.
2. The Selected Firm will be responsible for any cables, interfaces, or additional hardware to make any and all connections to such external devices, even if not specifically described or defined in this document.

F. GUI (Graphic User Interface) and System Programming (includes OPTIONAL ITEM 3)
1. The Selected Firm will be responsible for developing all Controller, Control Panel, Network, and Web Browser (if applicable) software code, as may be required for a full implementation of the system capabilities, as noted in this section.
2. Provide a Per-Classroom Unit Cost to develop and implement the Web Browser HTML code (as defined herein). This Unit Cost will be OPTIONAL ITEM 3, and will only be included in the Final Agreement with the Selected Firm if OPTIONAL ITEM 2 is selected as well.
3. The Selected Firm will develop the Graphical Interface Pages for Local Control Panels (if applicable), the Web Browser HTML access (if applicable), or both (if applicable). If both methods of Graphical Interface are used, the Web-based HTML pages will mirror the appearance, functions, controls, and feedback of the Local Control Panels.

4. For all classrooms employing the Integrated Multimedia Controller, the Selected Firm will also mirror all control capability and functionality (less graphic displays) to the integral LCD Panel and “soft keys” on the front panel of the Controller.

5. For Rooms 223, 281, and 283, the Integrated Multimedia Controller will provide control and diagnostic (if applicable) access to the functions of the specified Volume/Tone Control Card, the Broadband Cable Tuner, the Video Switcher/Scaler and the Video Projector, using the RS-232 or network control capability of these devices. For Room 223, the Integrated Multimedia Controller will also provide control access to the functions of the specified 6-Input VGA Switcher. The Selected Firm will be responsible for providing all control cables, connectors, or interfaces which may be required to fully accomplish this task, whether directly specified in this document or not.

6. For Ethernet-enabled classrooms (if applicable), the Selected Firm will develop the HTML Control Pages in such a manner as to match the general appearance and functionality of the Control Pages that are to be developed for other classrooms that have a Local Control Panel. This general appearance will be carried throughout all of the classroom projects employing HTML Control.

7. For Ethernet-enabled classrooms, if applicable, the HTML Control Pages will be uploaded to the Local Web Server located on the Ethernet Card in the Integrated Multimedia Controller. The Selected Firm will coordinate the assignment of static IP addresses with the University’s ITC Department.
8. The Selected Firm will present a Preliminary Layout and Design of the Control Pages and the proposed Functionality of the Multimedia Control System prior to finalizing the programming and design. The Multimedia Consultant and representatives of the University’s ITC staff will review this Preliminary Layout and Design and make any recommendations or suggested changes as they may feel are required. The Selected Firm will not finalize the development of the Programming, Graphic Interfaces and the Control Functionality until their Preliminary Layout and Design has been Approved and Signed by the University’s Project Coordinator, or their authorized representative.

III. Multimedia Control Systems Equipment Installation

A. The Selected Firm will be responsible for installation of the Multimedia Control System in the classroom/s. The Multimedia Consultant and Architect will approve exact locations, mounting methods, or other design criteria prior to final installation, unless already specified in this section. Locations (if applicable) are as shown on the University’s General Contract drawings.

B. The Selected Firm will label all devices, panels, jacks, and controls as to their functionality. Labels will be internal (insert labels for buttons, and similar), directly engraved, silk-screened, or engraved on Lamacoid-type permanent-adhesive labels. The Selected Firm will coordinate the labeling, choice of names or icons, and placement with the Multimedia Consultant and the Project Coordinator for ITC. No labels will be applied or finalized without signed approval by the University’s Project Coordinator, or their designated representative. It is the desire of the University to keep the naming or identification of devices, jacks, and controls as intuitive and simple as possible.

The use of “tape” style labels will not be acceptable for this project.
IV. Proof-of-Performance and Testing

A. For Items “B,” and “C” that follow, the Selected Firm will be responsible for performing operational tests, on all of the equipment furnished.

B. The Selected Firm will, in the presence of the Multimedia Consultant, University’s agent and/or any designated representatives of University, demonstrate all equipment items herein specified, showing them to be fully functional and capable of performing the tasks required. A checklist will be completed and initialized by University and the Multimedia Consultant certifying acceptance or rejection of performance, for each item.

C. All tests will be performed in the presence of the Multimedia Consultant and University’s agent, or designated representatives of University. Any equipment that does not meet specified performance criteria will be corrected or adjusted on-site if possible to establish compliance. Equipment that cannot be made to perform according to specification will be removed and replaced by the Selected Firm at no additional charge to University.
Attachment 5e
System Training and Documentation

I. Training

A. The Selected Firm will provide a minimum of 24 hours total of on-site training for the Ruffner Hall Classrooms (as a group) on all of the systems furnished within the scope of this Contract. Allocation of these hours into time “blocks” will be at the discretion of the University.

B. The Selected Firm will allow the University to videotape any of the training sessions, if they so desire.

II. Documentation

A. The Selected Firm will turn over five complete sets of “As-Built” Drawings to the University upon final acceptance of the installation, for each Classroom, as noted above. “As-Built” drawings must include all System Risers, Panel Drawings and Rack Layouts for all systems included in the classrooms. One additional set will be turned over to the Multimedia Consultant.

B. The Selected Firm will turn over five complete sets of all Manuals, Cut Sheets, and Service Documents to the University upon final acceptance of installation, for all major items of system hardware in the Classroom, as furnished by the Selected Firm. Sets will be suitably bound in large 3-ring binders, with section dividers and an Index. One additional set will be turned over to the Multimedia Consultant.

C. The Selected Firm will turn over five complete sets of all Programming Code, Graphic User Interface Pages, Sound System Programming, and any other software-based materials to the University upon final acceptance of installation, for all major items of system hardware in the Classroom, as furnished by the
Selected Firm. Sets will be suitably archived onto CD or 3-1/2” disk (CD preferred), labeled as to Project Name, Date, and Selected Firm, and turned over to the University upon final acceptance of installation. One additional set will be turned over to the Multimedia Consultant.
Attachment 5f
PROPOSAL FORM

(Firm will attach Bill of Materials for each classroom and all requested Optional Items, showing all major hardware items by Make and Model No., and detailing any variances from this Specification, as herein required.)

BASE BID – Room 223

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
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<tbody>
<tr>
<td>Materials</td>
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</tr>
<tr>
<td>Labor</td>
<td>$__________</td>
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</tbody>
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CLASSROOM TOTAL $______________

(NOTE: This Total Price must include ALL labor, materials, fees, and any other necessary costs to provide fully operational systems in the classrooms, as specified. The University will not be responsible for any additional fees.

BASE BID – Room 281

<table>
<thead>
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<td>Materials</td>
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<td>Labor</td>
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CLASSROOM TOTAL $______________
(NOTE: This Total Price must include ALL labor, materials, fees, and any other necessary costs to provide fully operational systems in the classrooms, as specified. The University will not be responsible for any additional fees.)

BASE BID – Room 283

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<td>Materials</td>
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CLASSROOM TOTAL $

(BASE BID – Rooms 175 and 187 Additions

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<td>Materials</td>
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CLASSROOM TOTAL $

(BASE BID – Room 283

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<td>Materials</td>
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<td>Labor</td>
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</table>

CLASSROOM TOTAL $
OPTIONAL ITEM 1 – Optional Classroom Visual Presenter

Material $________________

(NOTE: This Total Price must include ALL labor, materials, fees, and any other necessary costs to provide fully operational equipment for the classroom, as specified. The University will not be responsible for any additional fees.)

OPTIONAL ITEM 2 – Optional Classroom Ethernet Card (ea.)

Material $________________

Labor $________________

TOTAL $________________

(NOTE: This Total Price must include ALL labor, materials, fees, and any other necessary costs to provide fully operational equipment for the classroom, as specified. The University will not be responsible for any additional fees.)

OPTIONAL ITEM 3 – Optional Web Browser HTML Programming (ea.)

Labor $________________

(NOTE: This Total Price must include ALL labor, materials, fees, and any other necessary costs to provide fully operational equipment for the classroom, as specified. The University will not be responsible for any additional fees.)
Attachment 6
Multimedia Systems Specifications
for Culbreth Hall
Room 217
Attachment 6a
Sound Systems

I. Scope

A. Description
1. Overhead Distributed Speaker Systems as noted in the specifications and on the Drawings.
2. A Rack-Mounted Amplifier mounted in each of the Media Cabinets (furnished by the University), containing any necessary support electronics, as specified herein and shown on the Drawings, for Room 217. University-furnished Media Cabinets are equipped with standard 19” rack-rail mounting systems.
3. Peripheral Equipment and Accessories, as noted in the specifications and on the Drawings.

B. Performance Criteria
The Sound Systems herein specified are basic guidelines, indicating minimum required functionality and performance criteria. Firms must satisfy the fit, form, and function of the basic designs, but may present viable alternative approaches as their primary bid. Such presentations must be accompanied by a complete proposed Bill of Materials (all major items), and System Risers and/or line drawings indicating system connectivity, and verification that all basic design criteria are being satisfied.

C. Work By Others
Certain provisions have been made for conduit, junction boxes, furniture cutouts, and AC power in the existing University Renovation Work. It will be the responsibility of all firms to review these provisions thoroughly. Any additional work, either conduit, cutting, patching, etc. necessary to install the firm’s proposed system, and return an area to it’s current finished state, will be the sole responsibility of the firm, and will be included in their price.
II. Overhead Speaker System (1 System Required)

A. For Speech Reinforcement and Program Playback in the Room 217, furnish and install six ceiling-mounted speakers in an Overhead Distributed Array, at or near the locations specified on the drawings. The Selected Firm will furnish speaker, 70-Volt transformer, backbox, mounting bezel, baffle plate, tile bridge, Sound Barrier tile and all custom rigging hardware at each location. (As required by submitted product.)

1. The loudspeaker will be of in-ceiling design, consisting of a 165 mm (6.5 in) low frequency transducer, a coaxially mounted 19 mm (¾ in) high frequency transducer, and frequency-dividing network installed in a ported enclosure. The low frequency voice coil will be 25 mm (1 in) in diameter and the coil former will be of aluminum for maximum heat dissipation.

2. Performance specifications of a typical production unit will be as follows:
   a. Measured sensitivity (SPL at 1m [3.3 ft] with 4V input, averaged from 100 Hz to 10 kHz) will be at least 89 dB-SPL. Usable frequency response will extend from 75 Hz to 20 kHz (10 dB below rated sensitivity in half-space) with no external equalization.
   b. Rated power will be at least 70 watts continuous pink noise power, defined as conforming to international standard IEC268-5 (shaped pink noise with peak-to-average ratio of 6 dB) for a period of 100 continuous hours.
   c. The high frequency transducer will be horn-loaded to more evenly cover a minimum 110° conical coverage area.
   d. The backcan will be constructed of formed steel and the baffle of UL94V-0 fire rated high impact polystyrene. An enclosed terminal box will be included proving strain relief for use with either plenum-rated wire, ½ in (13 mm inside diameter) conduit, or flexible conduit up to 22 mm (M in) outside diameter. The external wiring will be accomplished via a removable lockable wiring connector with screw-down terminals to provide both
secure wire termination and prewiring capability before loudspeaker installation. An attachment loop will be provided on the back panel for cabling to building structure as a secondary support point.

e. The system will include a support backing plate to reinforce the ceiling material and tile support rails for use on either 2 x 4 ft or 600 x 1200 mm suspended ceiling tiles and which can all be installed from beneath the ceiling tile.

f. Overall front face diameter will not exceed 252 mm (9.9 in), overall depth from the bottom of the ceiling will not exceed 190 mm (7.5 in), and will weigh no more than 3.4 kg (7.5 lb).

g. The loudspeaker will be equipped with transformer for use in either 70.7 or 100V distributed-line speaker systems, with taps selectable by rotary switch located on the front panel so that the speaker does not have to be removed to adjust tap settings. Taps will be nominally 60W @ 70V, 30W @ 70V (60W @ 100V), 15W @ 70V (30W @ 100V), and 7.5W @ 70V (15W @ 100V).

3. The specified loudspeaker will be the JBL Model Control 26CT, or acceptable equal. All speakers MUST be furnished and installed with tile rails or tile bridges to distribute the weight onto the ceiling grid and not the ceiling tile itself.

B. The specified loudspeaker was chosen for its high-performance, ease of installation and service, clean appearance, and compliance with UL codes for installation in air-handling spaces.

C. All wiring for speakers will be furnished plenum-rated for use in air-handling spaces.

D. Each speaker will be covered over with a 2’ x 2’ (or larger, depending on the proposed speaker assembly) Tile of soft Vinyl Sound Barrier Material, to
minimize sound leakage above and through the ceilings. The Sound Barrier Material will be Audioseal™ Sound Barrier, as distributed by Acoustical Solutions, Inc. (http://www.acousticalsolutions.com) or Vinyl Sound Barrier, as distributed by Acoustics First Corp. (http://www.acousticsfirst.com). The tile piece will be mechanically isolated from the speaker backbox assembly with either a section of soft fiberglass or foam and taped or otherwise secured to the ceiling tile to minimize sound leakage from under the vinyl barrier.

E. Acceptable “equals” will include the Bose 102 series (if furnished with integrated system processor), the Altec 309-16T with all appropriate hardware, and the Atlas/Soundolier EQ818-T167 series, with all appropriate hardware. Each of these “equal” series must be furnished with all the required components to meet the specified form, fit, and function of the specified unit.

F. The Selected Firm will coordinate the exact location of the speakers in the rooms with the Multimedia Consultant, accommodating existing conditions. All wiring to and from the individual speakers may be run without conduit in the open ceiling, but must be securely attached to the structure above the ceiling grid in such a manner as to be out of the way of any service requirements for the lighting, plumbing, and HVAC, and must be plenum-rated.

III. Rackmount Mixer/Amplifier (one required)

A. For Room 217, furnish and install a Rackmount Modular Mixer/Amplifier system, capable of mixing up to three microphones, and four line input sources. Unit will also be furnished with an independent, transformer-isolated output. Amplifier section will be capable of supplying up to 150 Watts or greater into a 70-Volt speaker system.

B. Modular Chassis Specifications:
1. The mixer amplifier will have eight modular input channels and one dedicated program input.

2. The master section will include one master volume level control, two EQ controls providing 10 dB of boost or cut at 100 Hz and 10 kHz, a “contour” switch providing 6 dB of boost at 100 Hz and 6 dB of boost at 10 kHz, and a green status LED.

3. Internal muting will be accomplished at the modular level by means of two dedicated mute lines. External muting will be accomplished via screw terminals on the back panel.

4. Provision for an external master volume control will be made through barrier strip connections on the back panel.

5. The unit will be packaged in a rugged metal chassis 17” wide by 3.5” high by 15.5” deep.

6. The unit will be furnished with standard rack-mounting hardware.

7. The unit will operate from 120 volts AC, 60 Hz power.

8. The internal amplifier will be capable of delivering 150 watts RMS into 4 ohms and 8 ohms, as well as providing 25-volt and 70-volt line outputs. The unit will be capable of delivering rated power from 20 Hz to 20 kHz ±1 dB into 4 ohms at its direct output at less than 0.5% distortion with system hum and noise at least 77 dB below rated output.

C. Input Modules

1. The Standard Mic Input Module (three required) will provide a transformer-balanced mic preamp, screw-terminal input, mute capability, and selectable phantom power. This module to be used for the microphone-level output of the Audio Interface Panel, specified elsewhere.

2. The Balanced Bridging Line Input Modules (four required) will provide a transformer-balanced input, screw-terminal connections, and muting capability. Where required, the Input Module will be fitted with a custom resistive-combining network for connection to stereo signal sources.
3. The Balanced Line Output Module (one required) will provide a transformer-balanced output to screw-terminal connections. This module will be for future recording or broadcast capability.

D. The Specified Unit will be the Peavey Architectural Acoustics Division model MMA\textsuperscript{TM} 8150T, or equal, with three MPT-S Standard Mic Input Module, four BTM-S Balanced Line Input Modules, and one TLO-S Balanced Line Output Module. Unit will also be furnished with appropriate rack-mounting hardware.

E. “Equal” series must be furnished with all the required components to meet the specified form, fit, and function of the specified unit.

F. The System Equalizer is intended to be installed in the unbalanced, high-impedance signal-processing loop of the Mixer/Amplifier in these classrooms. The Selected Firm should be prepared to use isolation transformers in this signal path IF required to prevent ground loops. The cost for this/these potential additional item/s should be considered in the Firm’s proposal on this project.

G. Unit will be mounted in the University-installed Media Cabinet. Standard 19” rack mounting hardware is incorporated into the Media Cabinet.

IV. System Equalizer (one required)

A. For Room 217, furnish and install a programmable 1/3-Octave Graphic Equalizer with integral Automatic Parametric Notch Filtering for Feedback Suppression. This device will be inserted between the Mixer and the Amplifier sections of the Mixer/Amplifier product, using the signal-processing loop I/O feature.

B. The System Equalizer is a single channel signal processor that combines an equalizer, feedback reducer, limiter and delay in a single, half-rack enclosure. The unit is designed to be installed in the sound reinforcement signal path to
allow equalization of the overall sound system response and automatically detect
and control acoustical feedback. The equalizer of the unit can be set to act as a
30–band graphic or a 10–band parametric equalizer. The 1/3-octave graphic
equalizer can boost up to 6 dB or cut 12 dB for each band. The parametric
equalizer offers adjustable frequency, up to 6 dB of boost or 18 dB of cut, and up
to a two-octave bandwidth. The feedback reducer of the unit automatically inserts
narrow notch filters at detected feedback frequencies. These notch filters stop a
sound system from feeding back, but are narrow enough so their effect on audio
quality is minimized. The feedback detection algorithm constantly searches for
feedback, with or without the presence of program audio.

1. Hardware Features
   a. Crystal* 20-bit A/D and D/A converters (Analog-to-Digital,
      Digital-to-Analog) allows 104 dB of dynamic range.
   b. 48 kHz sampling rate provides flat response to 20 kHz.
   c. Onboard Scenes can be selected via front panel buttons.
   d. ½ rack space chassis allows rack mounting of one or two units in a
      single rack space with no sagging or bending.
   e. Link Interface allows multiple Link devices to be controlled with a
      single computer.
   f. There are no internal batteries. Settings and DSP program are
      stored in internal EEPROM.
   g. Electronically balanced input features combination ¼” and XLR
      connector and can be used with balanced or unbalanced outputs.
   h. Independently driven, cross-coupled, balanced ¼” and XLR
      outputs can be used with balanced or unbalanced inputs, without
      signal loss.
   i. Input and output levels are +4 dBu/–10 dBV DIP-switch-
      selectable.
   j. Processor engine will feature full 24-bit internal processing.
k. RS-232 interface allows external computer control and firmware updates.
l. Internal linear power supply is switchable between 120 and 230 Vac.
m. Solid-state bypass eliminates unreliable mechanical relays.

2. Software Features
   a. Adaptive Notch Filter algorithm (patent pending) automatically detects feedback and deploys up to 10 narrow band notch filters.
   b. A tamper-proof equalizer can be switched between 30-band graphic or 10-band parametric equalizer.
   c. The graphic equalizer is a constant-Q, 30-band, 1/3-octave graphic equalizer. It can boost up to 6 dB or cut 12 dB for each band.
   d. The parametric equalizer offers 10 filters with adjustable frequency, up to 6 dB of boost or 18 dB of cut, and up to a two-octave bandwidth.
   e. Up to 1.3 seconds of Digital Delay.
   f. Front and back panels both feature lockout controls.
   g. The Response Curve Viewer displays frequency response of the feedback reducer, equalizer, or both.
   h. 10 scenes can be stored on board. Multiple scenes can be stored to floppy or hard disk.
   i. The Limiter provides added protection to external speakers and amplifiers.

C. Specifications
1. Frequency Response: 20 to 20k Hz, ±1.0 dB re 1 kHz
2. Dynamic Range: 104 dB minimum, A-weighted, 20 Hz to 20 kHz
3. Sampling Rate: 48 kHz
4. Digital-to-Analog, Analog-to-Digital Conversion: 20 bit resolution
5. Voltage Gain:
   a. 1 dB ± 1dB (power off)
b. 0 dB ± 2 dB (equal input and output sensitivities)
c. 12 dB ± 2 dB (input –10 dBV, output +4 dBu)
d. 12 dB ± 2 dB (input +4 dBu, output –10 dBV)

6. Impedance:
   a. Input: 47 ± 20% actual
   b. Output: 120 ± 20% actual

7. Input Clipping Level:
   a. +18 dBu minimum (at +4 dBu setting)
   b. +4 dBV minimum (at –10 dBV setting)

8. Output Clipping Level:
   a. +18 dBu minimum (at +4 dBu setting)
   b. +4 dBV minimum (at –10 dBV setting)

9. Total Harmonic Distortion: < 0.05% at 1 kHz, +4 dBu, 20 to 20 kHz

10. LED Signal Indicators:
    a. Clip: 6 dB down from input clipping

11. Propagation Delay from Input to Output: 1.0 ms, all filters set to Flat (0 ms delay setting)

12. Polarity:
    a. Input to output: non-inverting
    b. XLR: pin 2 positive with respect to pin 3
    c. ¼-in. TRS: tip positive with respect to ring

13. Feedback Filters:
    a. Ten 1/10-octave adaptive notch filters from 60Hz to 20 kHz
    b. Deployed to 1 Hz resolution of feedback frequency
    c. Deployed in depths of 3 dB, 6 dB, 9 dB, 12 dB, and 18 dB (12.5 d. Low Q in graphic EQ mode) attenuation
    d. Filter shape variable between HI-Q and LOW-Q

14. Graphic Equalizer:
    a. Frequency Bands: 30 bands on ISO, 1 / 3 -octave centers
    b. Filter Type: 1/3-octave, constant Q
c. Maximum Boost: 6 dB per band
d. Maximum Cut: 12 dB per band
e. High- and low-pass filters: 12 dB/octave nominal

15. Parametric Equalizer:
   a. Frequency Bands: 10 bands, variable frequency, variable Q
   b. Boost/Cut Range: +6 dB to −18 dB per band
   c. Q Range: 1/40-octave to 2-octave
   d. Shelf/Rolloff Filters:
      • Shelf: +6 to −18 dB per filter
      • Rolloff: 6 dB, 12 dB, 18 dB, or 24 dB per octave nominal

16. Delay:
   a. Up to 1.3 seconds

17. Limiter:
   a. Threshold: −60 dB to −0.5 dB, 0.5 dB resolution
   b. Attack: 1 ms to 200 ms
   c. Decay: 50 ms to 1000 ms
   d. Ratio: Infinity to 1

18. Operating Voltage:
   a. 120 Vac, 50/60 Hz, 75 mA max

19. Temperature Range:
   a. Operating: −7° to 49° C (20° to 140° F)

20. Dimensions:
   a. 219 mm x 137 mm x 44.5 mm
   b. 8-5/8 in. x 5-3/8 in. x 1-3/4 in.

21. Weight:
   a. 930 g (2.05 lbs.)

D. The Specified Unit will be the Shure Model DFR11EQ-V5, or equal.

E. Acceptable “equals” will include the comparable products from the following manufacturers that either meet or exceed these specifications. Acceptable
manufacturers will be Sabine, Inc, Rane, Biamp, BSS, and Peavey MediaMatrix. Any substitutions must meet the fit, form, and function of the specified product, and include any additional mounting hardware required. The use of processors that employ manual hardware-controlled operation will not be acceptable.

F. The Selected Firm will provide to the University, upon completion of the installation, the Configuration Software and the individualized setup files for each of the two classrooms.

V. Wired Microphone/Audio Interface Systems

A. Wired Condenser Lavalier Microphone (one required)

1. For Room 217, furnish one standard, wired condenser lavalier microphone.

2. The product specified incorporates the following features.

   a. Interchangeable cartridges that provide an optimal choice for each application.

   b. Rotatable tie clip that pivots in 90° increments for placement flexibility.

   c. Supplied snap-fit foam windscreen that controls breath noise and stays on securely.

   d. Balanced, transformerless output for increased immunity to noise over long cable runs.

   e. Supplied dual tie clip holds two microphones for dual micing applications.

   f. Type of microphone will be an electret condenser, cardiod pickup pattern, frequency response 50 to 17,000 Hz, sensitivity –53.5 dB, maximum SPL 123 dB, and signal-to-noise ratio 70.5 dB (referenced at 94 dB-SPL). Unit will be phantom-powered by 11 to 52 VDC @ 2.0 mA maximum. Unit will be furnished with a
properly terminated cable, minimum 4’ in length. Unit will also be furnished with a 25’ balanced microphone extension cable.

3. The specified product will be the Shure Model MX185, or equal.

4. Acceptable “equals” will include the comparable products from other manufacturers that either meet or exceed these specifications. Acceptable manufacturers will include Electro-Voice, AKG, Audio-Technica, Sennheiser, Sony, Telex and Beyerdynamic. Any substitutions must meet the fit, form, and function of the specified product.

B. Audio Interface Panel (one required)

1. For Room 217, furnish and install one Audio Interface Panel, which be installed on a University-furnished standard 2-Gang NEMA wall box. This device will be mounted on the Media Cabinet, depending on the individual classroom, at the location designated on the drawings, or as approved by the Multimedia Consultant.

2. The product specified incorporates the following features.
   a. The signal splitting/impedance matching unit will be suitable for interfacing one unbalanced high- or low-impedance source to one balanced or floating low-impedance (1.0K ohm nominal) microphone preamplifier input.
   b. There will be one ¼” (6.3mm) 2-conductor phone jack, and two RCA phone jacks to provide input for the source. There will be a 16-ohm, 5.0-watt load resistor to accommodate speaker-level sources. There will be a Left + Right resistive mixer summing the RCA inputs to accommodate line-level sources. The output will be a balanced, low-impedance, mic level signal, which will be brought to a barrier strip. This section of the panel will include a 10K-ohm level control, with a 0-10 calibrated knob, for further signal level matching.
   c. There will be one 3-pin female XLR-type connector, independent of the above, for pass-thru connection of low-impedance mics.
d. The primary electrostatic shield will be connected to the source input ground and to the mounting plate. The secondary electrostatic shield will be connected to pin 1 of the low-impedance XLR output. There will be a ground lift switch to allow the shields to be connected together or isolated as required. The XLR output connector will be wired with pin 2 “hot” or “in phase” with respect to the input, and pin 3 “cold” or “out-of-phase”.

e. The Interface will be furnished on a single two-gang standard NEMA Wall Plate. Epoxy silk-screening will identify control functions. Switches will be of the miniature “rocker” type and will be recessed.

3. The specified signal splitting/impedance matching unit will be a Pro-Co Monoface AVP-1V Audio-Visual Interface.

4. Acceptable “equals” will include the comparable products from other manufacturers that either meet or exceed these specifications. Any substitutions must meet the fit, form, and function of the specified product.

VI. Wireless Microphone Systems

A. Furnish and install one Wireless Lavalier Microphone System operating in the UHF frequency range. The System will be furnished with Receiver, Transmitter, and specified microphone, or microphone capsule.

B. The recommended Wireless System will be a frequency–agile diversity system operating in the UHF band. Both the receiver and the transmitter will be synthesizer controlled via Phase Locked Loop (PLL) circuitry for a clear, steady signal.

C. Performance Features:

1. UHF band operation
2. Frequency–agility will allow user to change system frequency if interference is encountered. Over 100 user–selectable frequencies will be available.
3. Up to 16 systems can operate simultaneously.
4. Noise Squelch Circuitry will analyze signal quality rather than signal strength, virtually eliminating the possibility of noise bursts.
5. Tone Key Squelch will prevent unwanted noise from entering the system, including the ’pop’ noise that occurs when the transmitter is turned on and off.
6. Extensive RF and audio metering.
7. Low transmitter battery warning LED on receiver.
8. Preconfigured Group/Channel and frequency for simplified setup of multiple wireless systems.
9. Two Band EQ feature on receiver to fine tune frequency response.
10. Receiver logic capability to control external equipment.
11. Remote mute feature on bodypack; optional accessory switch to externally mute bodypack transmitter during operation.

D. Components
2. Diversity Receiver with external in–line power supply (100/120/230 Vac).
3. Microphone capsule furnished will be identical to that specified in Item V.A. above, Wired Condenser Lavalier Microphone.

E. Specifications
1. RF Carrier Frequency Range: 774–862 MHz (782–806 MHz for U.S. models).
2. Working Range: 152.4 m (500 ft), minimum, under typical conditions; 487.6 m (1600 ft.) line of sight. NOTE: Actual working range depends on RF signal absorption, reflection and interference.
3. Audio Frequency Response: 45 to 15,000 Hz, ±2 dB. NOTE: Overall system frequency response depends on the microphone element
4. Modulation: ±45kHz deviation compressor-expander system with pre-and de-emphasis (U.S. models only; international models may vary)
5. RF Power Output: 50 mW, typical
6. Dynamic Range: >100 dB, A-weighted
7. Receiver Audio Output Level (Maximum): +5 dBu typical, unbalanced output; +14 dBu typical, balanced output
8. RF Sensitivity: –108 dBm at 12 dB SINAD
9. Image Rejection: 90 dB typical
10. Spurious Rejection: 70 dB typical
11. Ultimate Quieting (ref. ±45 kHz deviation): >100 dB, A-weighted
12. Audio Polarity: Positive pressure on microphone diaphragm produces positive voltage on pin 2 with respect to pin 3 of low impedance output and the tip of the high impedance 1/4-inch output
13. System Distortion (ref. ±45 kHz deviation, 1 kHz modulation): 0.4% Total Harmonic Distortion typical

F. Power Requirements
1. Transmitter: 9V alkaline battery (Duracell MN1604 recommended); NiCad optional
2. Receiver: 15 Vdc, 600 mA 50/60 Hz
3. Power Consumption: 600 mA x 15 V, maximum Transmitter Battery Life (Typical) 8 hours (with Duracell MN1604 9V alkaline battery)

G. Operating Temperature Range
1. 7 to 49 C (20 to 120 F) NOTE: Battery characteristics may limit this range

H. The specified system will be the Shure UC14/85, or equal.
I. Acceptable “equals” will include products by Vega, Telex, AKG, Sennheiser, and Sony. Any substitutions must meet the fit, form, and function of the specified product, and include any additional mounting hardware required. Proposed substitutions must be approved in the Submittal process, but may be specified in the bid by manufacturer and model no.

J. Note: It will be the responsibility of the Firm to determine optimal frequency selection, receiver antenna selection and placement. Any additional wiring, hardware (different antennas, boosters, splitters), or mounting, if required for reliable operation of the wireless microphone system, will be included in the Firm’s price, at no additional cost to the University

VII. Audio Wire and Cable

A. Speaker wiring will be 18 ga. or larger for 70 Volt distribution, 14 ga. or larger for low-Z speaker lines, and 22 ga. or larger shielded, twisted-pair for microphone/line levels. The use of multi-core cables is encouraged wherever practical. For this project, the use of plenum-rated cable is required.

B. All new cable runs to microphone, line, or speaker junction boxes will include a minimum of 20% spares, for future use if required. If all existing cables in a conduit are used in this project, additional spares will be installed to comply with this requirement.

C. All conduits used by the Selected Firm will be left with a pull-string installed.

D. All cable “home runs” must be continuous, with no splices.
VIII. Sound System Installation

A. General
   1. All sound installation practices will conform to the methods and
techniques set forth in Appendix II, “Recommended Wiring Practices,”
Sound System Engineering, Second Edition, Don Davis and Carolyn
   2. It is the University’s intent that the operation of this system be as simple
and intuitive as possible. To that end, firms proposing alternate equipment
should exercise due caution in overly complicating their proposal.

B. Field Quality and Control
   1. The Selected Firm must examine areas and conditions under which sound
equipment and controls are to be installed and notify Multimedia
Consultant in writing of any conditions detrimental to the proper
completion of the work. The Selected Firm will not proceed with the
work until unsatisfactory conditions have been corrected in a manner
acceptable to both parties.
   2. All wiring and equipment must be new, in factory sealed cartons, prior to
its installation on the job.
   3. The Selected Firm will maintain a Project Foreman for the job, who will
remain the same throughout the period of installation and acceptance,
unless changes are required due to illness or other causes beyond The
Selected Firm’s control.

C. Installation
   1. System Grounding
      a. The wiring and shielding of all signal cables will be maintained
insulated and ungrounded until deliberate connection is made at
one, and only one, point, as per an overall grounding plan.
b. The above provision will be modified when unbalanced lines, or coaxial-unbalanced cable systems are employed, where applicable.

2. All system work, both inside and outside of the Backbox unit/s, Media Cabinets, and junction boxes, will be subject to inspection and approval with respect to neatness, good engineering practices, selection and use of materials, and professional appearance. All cables will be labeled at both ends, and on the system drawings (as-built), for ease of servicing and/or future modifications. All controls will be clearly labeled as to function and nominal setting. All labeling and marking will be complete and in place prior to Final Testing.

3. All wires connecting to binding posts, terminals, or barrier strips will be fitted with compression lugs, sized properly for the wire and termination point. The use of wire-nuts, or other free-floating methods of connection will not be allowed, except for speaker connections.

4. Provisions have been made in the conduit layout to minimize the need to run signals from the different systems in the same pipe. Wherever feasible, within the limitations of the conduit layout, sound system wiring should be run in dedicated pipes, and under no circumstances should run in any conduit with high-voltage AC wiring.

5. All conduit systems, cabinets, racks, or other sound equipment must be grounded properly. Where PVC conduit is used, a continuous ground conductor, no less than #12 Copper, will be installed through the conduit to connect equipment grounds at the termination points, or bond racks and/or conduit.

IX. Proof-of-Performance & Testing

A. The Selected Firm will, in the presence of University and/or any designated representative of University, and the Multimedia Consultant, demonstrate all items and functions of the new sound systems, showing them to be fully functional and capable of performing the tasks required.
B. In operation, the Sound Systems will have no audible buzzes, clicks, pops, or other noises that might detract from the planned functions in the facility. The Selected Firm will demonstrate system noise levels to the University, certifying compliance with this requirement. The Sound Systems must be demonstrated with all other Multimedia systems active, especially the classroom lighting, to verify that there is no audible “dimmer noise” or other system noises that might occur in normal operation.

C. All required measurements noted hereafter must be done in the presence of University, or a designated representative of University, and the Multimedia Consultant. All equipment used in making measurements must be fully documented and approved prior to testing, for acceptance by the Multimedia Consultant. Equipment not meeting acceptable standards will not be allowed and The Selected Firm will furnish acceptable equipment at their own expense.

D. Overhead Distributed Speaker System Frequency Response
   1. For Room 217, System Frequency Response will be “optimized” for maximum gain-before-feedback and intelligibility in the speech range, using the installed system equalizer, to the response curve designated in Item 2. However, it should be noted that full-range audio playback from a VCR and other possible sources WILL be handled by the same speaker system, and this should be considered in the final equalization choices.
   2. The recommended frequency response should be nominally flat, +/- 3 dB, from 100 Hz.-4000 Hz., with a gradual 2 dB/octave rolloff above that point. This will be designated the “House Curve”. The “House Curve” will be fully documented in print, and made available to the Multimedia Consultant at the time of Final Testing, certifying compliance with these requirements. Acceptable types of test equipment that may be utilized are laboratory-grade 1/3-Octave Real-Time Analyzers (w/printout capability), dual-channel FFT Analyzers (SmaartPro or SmaartLive), TDS analyzers (TEF, MLSSA, SYSID), or warble-tone generators with averaging filters
and chart recorder. Swept sine wave measurements will not be acceptable for this purpose. Manually graphed measurements will not be acceptable for this purpose.

E. System Phasing
Using acceptable methods of polarity testing, the Selected Firm will certify that all microphones and speakers are properly and additively phased. A checklist will be made available to the Multimedia Consultant at the time of Final Testing, certifying that polarity testing has been done on all items.

F. Individual Source Testing
The Selected Firm will, in the presence of all attendees, demonstrate and verify the proper performance of the Wired and Wireless Mics (if applicable), the Audio Interface, VCR audio, and the audio from a computer (The Selected Firm-furnished laptop, if University-furnished computer is not available at the time of testing.). Appropriate levels will be set and suitably marked for all major local signal sources prior to Final Testing (note that these may need to be adjusted in the testing phase).
Attachment 6b
Video Systems

I. Scope

A. Description
1. This section includes all Multimedia Video/Graphics Equipment. Included in this section will be an XGA LCD Video/Graphics Projector, a VHS/S-VHS Recorder/Player, a Video/Graphics System Switcher/Scaler, a Visual Presenter, an internal Computer Interface for University-furnished local PC, and a cabinet-mounted Computer Interface in the quantities as noted in the specifications and on the Drawings.
2. Peripheral Equipment and Accessories, as noted in the specifications and on the Drawings.
3. The Selected Firm is responsible for furnishing fully operational systems to University on completion of this project. Items not specifically listed in this section, but required for proper operation of the systems herein described, will be the responsibility of the Selected Firm to provide as part of the package.

B. Performance Criteria
The Video Systems herein specified are basic guidelines, indicating minimum required functionality and performance criteria. Firms must satisfy the fit, form, and function of the basic designs, but may present viable alternative approaches as their primary bid. Such presentations must be accompanied by a complete proposed Bill of Materials (all major items), and System Risers and/or line drawings indicating system connectivity, and verification that all basic design criteria are being satisfied.

C. Work By Others
Certain provisions have been made for conduit, junction boxes, furniture cutouts, and AC power in the existing University Renovation Work. It will be the
responsibility of all firms to review these provisions thoroughly. Of specific note should be that the various wall and cabinet-mounted junction boxes and conduit runs are being furnished and installed by the University, and are as noted on those drawings and specifications. Any additional work, either conduit, cutting, patching, etc. necessary to install the firm’s proposed system, and return an area to it’s current finished state, will be the sole responsibility of the firm, and will be included in their price.

II. Video System Equipment

A. Video Projectors (one required)

1. For Room 217, furnish and install one wall-mounted LCD Color Multimedia Projector. The Projector will be located at the approximate designated point on the Drawings, and will be securely mounted to the actual ceiling structure or trusses. Mounting to the ceiling tile grid will not be acceptable. Projector will also be secured to its mount in such a fashion as to discourage theft or tampering.

2. The actual fixed location of the projector will be determined by the Selected Firm and approved by the Multimedia Consultant prior to installation. No mounting will be commenced without this prior determination and approval. The Selected Firm will ensure that the projector is mounted level, rigid, and at a mounting height suitable for projection on the furnished screens with no keystoning effects. Any mounting that may affect the structural aspects of the room (ceiling grid, duct work, etc.) must be approved by the University’s Facilities Management Dept. representative prior to commencement of installation.

3. The specified product incorporates the following features.
   a. Display Technology: 1.3” polysilicon; TFT LCD x 3
   b. Resolution: XGA 1024 x 768
c. Resolutions Supported: XGA (1024 x 768), Fit-to-View display of VGA (640 x 480), SVGA (800 x 600), SXGA (1280 x 1024), MAC
d. Brightness: 2200 ANSI lumens
e. Contrast Ratio: 350:1 (ANSI 100:1)
g. Video Compatibility: NTSC, NTSC 4.43, PAL, PAL-M, PAL-N, SECAM, HDTV
h. Sources: 2 RGB computer, 2 audio, 1 composite video, 1 S-video, 1 component/HDTV Video
i. H-Sync Range: 15 to 100 KHz
j. V-Sync Range: 50 to 100 Hz
k. Dot Clock: 165 MHz
l. Aspect Ratio: std: 4:3 - wide: 16:9
m. Image Size (Diagonal): 30” to 400”
 n. Lens: Power zoom and focus lens 1.3:1 ratio; Focal length: 1.9” to 2.47”, F 1.8 to F 2.1
o. Projection Distance (From Screen): 4.6 ft to 47.2 ft
q. Lamp: 200 watt (UHP)
r. Audio: 3W + 3W RMS stereo
s. Remote Control: Laser F/X wireless IR remote with mouse control and laser pointer
t. Dimensions: 10.2” W x 15.4” L x 6.3” H
u. Weight: 15.2 lbs.
v. Power Consumption: 300 watts
w. Power Requirements: 100 to 120V / 220 to 240V at 50/60 Hz
x. Operating Temperature (Sea Level): 41 F to 95 F (5 C to 35 C)
y. Approvals: FCC Class A (U.S.), UL, c-UL (Canada), CE
z. Warranty: three year parts and labor (excluding lamp); 90 days lamp

4. The specified LCD Projector will be the Sanyo Model PLC-XP20N, comparable models (equal) from Proxima or Eiki, or acceptable “equals” as defined below (subject to Item 7).

5. The LCD Projector will be supplied with a NEMA-Enclosure Series-Mode Surge Suppressor, which will be the Surge-X Model SX15-NE (see http://www.surgex.com ). The use of Shunt-Mode Surge Suppressors will not be acceptable. The Surge Suppressor will be installed by the University, in series with the University-supplied AC outlet designated for the projector. The Selected Firm will be responsible for furnishing the specified Surge Suppressor to the University Facilities Management Division for installation. The University’s Project Coordinator will arrange coordination of delivery.

6. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product. Other manufacturers whose products “may” be “equal” include Toshiba, Epson, In-Focus, Barco, NEC, Sharp and Sony. However, the Firm specifying one of these potential “equals” must provide with their bid a “detailed” description showing how their product differs from the specified unit, and what advantages/disadvantages it may have.

Products proposed which are not capable of “true” or “native” XGA resolution will not be acceptable.

7. NOTE: The University has purchased a reasonable quantity of the same manufacture or type Projector as herein specified. ITC staff and University faculty have been trained in its operation, and are currently familiar with its features and capabilities. ITC wishes to continue the use
of this type unless compelling reasons can be presented for making a change. Therefore, preference will be given to those firms furnishing this line item “as specified”. Firms wishing to submit “equals” must provide all of the information noted above, as well as an additional narrative explaining the advantages to the University which might prove more beneficial than the continuity of models as described herein.

B. Multimedia Input Plate / Computer Interface (one required)

1. Furnish one Multimedia Input Plate / Computer Interface. This device will be permanently Media Cabinet-mounted (see University dwgs.)

2. The Interface will be a high performance computer video interface for analog video signals including VGA, SVGA, XGA, MAC, SUN and other high-resolution workstations. The unit will have a modular faceplate designed to accept A/V connector plates, allowing the unit to also act as a customizable A/V connector plate. The unit will mount in the wall of the media cabinet, with or without a backbox, as required by the furnished unit. The University has NOT provided a backbox in the Media Cabinet design. The unit will be furnished with a White finish for Media Cabinet mounting.

3. The Interface will perform the following two primary functions:
   a. Signal Splitting - allows the simultaneous connection and viewing of both the computer’s local monitor and a second output device such as a large screen data projector or monitor.
      • The University will furnish the Local PC and the Local Flat-Panel LCD Monitor.
      • The Selected Firm will be responsible for all cabling between these two devices and their proposed equipment complement.
      • Provision has been made for a blank panel on the side of the Media Cabinet for mounting an external HD15
connector - to be use for connection to the University-furnished Monitor.

b. Physical Interfacing - Computers employ many different types of video output connectors, making it difficult to hook up computers directly to data projection devices. The Interface simplifies interfacing, routing, and switching tasks by acting as universal adapters. Through the use of removable input cables, the Interface can be attached to different computers and will provide a video output signal on five BNC connectors that can easily be connected to an RGB display device. The output signal format may be set to any of the following formats: RGBHV (default), RGBS, and RGsB.

4. The specified product incorporates the following features.
   a. Installation Design - unit mounts in a wall, floor box, conference table, podium or other A/V furniture
   b. 300 MHz (-3dB) RGB video bandwidth
   c. ADSP™ Advanced Digital Sync Processing™, or equivalent, to ensure sync compatibility with digital displays such as LCD projectors.
   d. Active PC audio interfacing, to provide a buffered, balanced stereo output to the audio system
   e. Horizontal shift control
   f. Composite or separate horizontal and vertical sync (DIP switch-selectable)
   g. Sync on green output (DIP switch-selectable)
   h. Serration pulse removal (DIP switch-selectable)
   i. DDSP™ Digital Display Sync Processing™, or equivalent, to ensure sync stability with LCD projectors
   j. ID bit termination on pins 4 and 11
k. Installation plate for use in existing walls without the need for masonry boxes
l. Four spaces for Architectural Adapter Plates for signal pass-through connectors

5. Compatibility:
   a. Input Signals: The Interface will accept high-resolution video signals from virtually any computer that outputs an analog video signal. The unit will work with signals at virtually any resolution and refresh rate. Compatible computer video signals include VGA, SVGA, XGA, MAC, SUN, SGI and other high-resolution computers outputting an analog video signal. Input signal compatibility parameters are listed below.
      - Video Signal: Analog RGB Video
      - Signal format: RGBHV, RGBS, RGsB, RsGsBs
      - Horizontal Frequency Range: 15 KHz to 130 KHz
      - Vertical Refresh Rates: 30 Hz to 120 Hz
   b. Output signals: The Interface will accept high-resolution video signals from virtually any computer that outputs an analog video signal. The unit will work with signals at virtually any resolution and refresh rate. Compatible computer video signals include VGA, SVGA, XGA, MAC, SUN, SGI and other high-resolution computers outputting an analog video signal.

6. Performance Specifications:
   a. Video input
      - Number/signal type: 1 analog RGBHV, RGBS, RGsB, RsGsBs
      - Connectors: (1) 15-pin HD male (Mac and Sun/SGI to VGA adapter cables are available)
      - Nominal level: Analog — 0.7V p-p
      - Minimum/maximum levels: Analog — 0.3V to 1.5V p-p
b. **Audio input**
   - Number/type: (1) PC level stereo, unbalanced
   - Connectors: (1) 3.5 mm stereo jack, 2 channel
   - Impedance: 10 k-ohms, DC coupled
   - Minimum level: 100mV

c. **Sync Input type:** RGBHV TTL (+/-), RGBS TTL (+/-), RGsB 0.3V (-), RsGsBs 1.3V (-)

d. **Video throughput**
   - Gain: Unity, 0.725V p-p with 50% peaking, 0.750V p-p with 100% peaking
   - Bandwidth: 300 MHz (-3dB)

    **Controls:**

e. **Video output**
   - Number/signal type: 1 analog RGBHV, RGBS, RGsB
   - Connectors: 5 BNC female; 15-pin HD female (buffered local monitor output)
   - Nominal level: Unity, 0.725V p-p with 50% peaking, 0.750V p-p with 100% peaking

f. **Audio output**
   - Number/type: 1 stereo (2 channel), balanced/unbalanced
   - Connectors: 3.5 mm stereo captive screw terminal
   - Impedance: 50 ohms unbalanced, 100 ohms balanced

g. **Sync Output type:** RGBHV, RGBS, RGsB (switch-selectable)

h. **Sync Polarity:** When RGBHV is input, polarity follows input; and jumper is set to follow, otherwise negative; RGBS, RGsB negative

7. **Mechanical Specifications:**
   a. Power: 12 to 24VAC or VDC, 0.5 A, 5 watts, external
   b. Enclosure type: Metal
   c. Faceplate: 4.5" H x 8.33" W
d. Enclosure dimensions: 2.5" H x 3.7" W x 1.74" D

e. Shipping weight: 3 lbs (1.4 kg)

f. Approvals: UL, CUL, CE, FCC Class A

8. The specified unit will be the Extron RGB 558 Architectural Universal, 15-Pin HD Input, Mountable Interface with Audio, ADSP™ and Optional Architectural Plates, or equal product by Inline.

9. The specified units will be furnished and installed with one each Extron Model 70-107-26 Combination Pass-through Plate (or equal by Inline), and Extron Model 70-103-21 XLR 3-Pin Female Module (or equal by Inline). Color will match Interface unit.

10. The specified unit will be furnished with one Extron 26-491-03 HD15 Laptop Breakout Cable w/Audio, 12’ in length, or equal product by Inline.

11. The Selected Firm will also furnish a 10’ HD15 VGA Extension Cable to the University’s representative, for use in further extending the Local Monitor’s cable.

12. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product. Note that a junction box is not being furnished and installed by the University.

C. Video/Graphics Switcher/Scaler (one required)

1. Furnish and install one 7x1 Switcher with Built-In Video Scaler. This unit will be mounted in the equipment rack section of the Media Cabinets, and will be used to select from multiple Video, S-Video, or RGB sources to route to the Video Projector.

2. The specified product is a seven input, dual output, multi-format switcher with a built-in video scaler. The unit features system control along with RGB & video integration capabilities ideal for permanent installations using plasma displays as well as CRT, LCD, and DLP projectors.
3. This system switcher provides video scaling, which uses advanced up-conversion technologies to match the rates and resolutions of video inputs to the higher native resolution of today’s fixed matrix displays. RS-232 or IR projector & room control, universal compatibility with displays, and audio switching capabilities are also offered. To optimize image quality as well as maintain maximum image brightness and detail, video inputs should be scaled to progressive scanning RGB resolutions that match the “sweet spot” or native resolution of the digital display being used. Using advanced digital video scaling technologies, the unit scales any video input, including any progressive signal, to one of twelve common computer-video, progressive HDTV, or plasma resolutions. RGB inputs are passed through.

4. The specified product provides a total of seven inputs. Six of the inputs are configurable for composite video, S-video, component video, or RGB. Located on the front panel, the seventh input accepts composite video, S-video, or computer-video on a 15-pin HD connector. Also, the unit is able to control and accept signals from a slaved switcher on input #1. Each input accepts audio, and audio attenuation/gain is available.

5. The specified product incorporates the following features.
   a. Universal projector control – The specified unit provides universal projector control via downloadable RS-232 or IR drivers, IR learning capabilities, or user-defined RS-232 commands.
   b. Remote IR learning capabilities – The specified unit learns and manipulates IR remote control signals. A two row, 16-character LCD guides the user through the IR learning process.
   c. Room control – Room lighting, screen settings, and other device functions may be controlled through the specified unit’s room function, via internal relays. Relays may be controlled from the front panel, furnished IR remote, RS-232 control, or optional control pads.
d. Triple-Action Switching™ (RGB delay) – Blanks the screen when the switcher switches to a new source, eliminating visible switching transitions.

e. Balanced/unbalanced audio – Audio gain/attenuation adjustments for each input provided. Audio breakaway available through RS-232 only.

f. Quad-standard video decoding compatibility – The specified unit uses a digital, four-line adaptive comb filter to decode NTSC 3.58, NTSC 4.43, PAL, and SECAM.

g. Inputs – The specified unit accepts any progressive YUV signal, including HDTV 480p and 720p. Six of the inputs are fully configurable for composite video, S-video, component video, or RGB. Located on the front panel, the seventh configurable input accepts composite video, S-video, or RGB on a 15-pin HD.

h. Scaled outputs – All composite video, S-video, and component video signals are scaled and output simultaneously on a 15-pin HD connector and five BNC’s. The specified unit offers industry standard computer-video output rates: 640 x 480, 800 x 600, 832 x 624, 1024 x 768, and 1280 x 1024. For plasma displays, the specified unit provides plasma output rates: 848 x 480, 852 x 480, 1280 x 768, and 1360 x 765. Also offered are HDTV 480p, 720p, and 1080p output rates.

i. Pass-through outputs – All RGB inputs are passed through and output simultaneously on a 15-pin HD connector and five BNC’s.

j. Picture controls – Horizontal & vertical shift, color, tint, brightness, contrast, detail (image sharpness), and top & bottom vertical blanking adjustments provided. Variable vertical blanking adjustments allow a user to mask noise that occasionally appears at the top and bottom of a processed image or to crop unneeded portions of an image.
k. Executive mode – Locks out all front panel functions except basic switching and control commands; however, all functions available through RS-232 control.
l. High bandwidth – 350 MHz (-3dB) video bandwidth maintains signal integrity.
m. Rack-mountable – Housed in a 2U high, one rack width enclosure. Mounting brackets included for mounting in a rack.

6. Performance Specifications:
   a. Video input
      • Number/signal type:
         – (6) RGBHV/RGBS/RGsB/RsGsBs computer video, component video, S-video, or composite video
         – (1) RGBHV/RGBS/RGsB/RsGsBs computer video, S-video, or composite video
      • Connectors
         – 6 x 5 BNC female: RGB computer video, component video, S-video, or composite video
         – (1) 15-pin HD female: RGB computer video (input 7)
         – (1) 4-pin mini-DIN female: S-video (input 7)
         – (1) RCA female: Composite video (input 7)
      • Nominal level:
         – Analog— 1.0V p-p
         – Minimum/maximum levels: Analog— 0.3-2.0V p-p
      • Impedance: 75 ohms
      • Horizontal frequency: 15 kHz to 150 kHz
      • Vertical frequency: 30 Hz to 150 Hz
      • Return loss: -30dB @ 5 MHz
      • Maximum DC offset: 1.5V
   b. Video throughput
• Gain: Unity
• Bandwidth: 350 MHz (-3dB)
• Frequency response: < ± 0.1dB @ 30 MHz
• Differential phase error: 0.01º, 0 to 10 MHz
• Differential gain error: 0.01%, 0 to 10 MHz
• Crosstalk: -50dB @ 5 MHz

c. Video output
• Number/signal type: (2) RGBHV/RGBS/RsGsBs*
  computer video  (*RsGsBs will be output only if the input is RsGsBs.)
• Connectors:
  – 1 x 5 BNC female
  – (1) 15-pin HD female
• Nominal level: 1.0V p-p
• Minimum/maximum levels: 0.3-2.0V p-p
• Impedance: 75 ohms
• Return loss: -30dB @ 5 MHz
• DC offset: ±5mV maximum
• Switching type: Triple action

d. Sync
• Input type: RGBHV, RGBS, RGsB, RsGsBs
• Output type: RGBHV, RGBS, RGsB, RsGsBs*  (*RsGsBs will be output only if the input is RsGsBs.)
• Standards:
  – TTL (RGB)
  – NTSC 3.58, NTSC 4.43, PAL and SECAM (S-video and composite video)
• Input level: 3V to 5V p-p
• Output level: 5V p-p
• Input impedance: 510 ohms
• Output impedance: 75 ohms
• Max input voltage: 5V p-p
• Max. propagation delay: 20 nS
• Polarity: Positive or negative (follows input)
e. Audio input
  • Number/signal type:
    – (6) stereo, balanced/unbalanced
    – (1) stereo, unbalanced
  • Connectors:
    – (6) 3.5 mm captive screw terminals, 5 pole
    – (1) 3.5 mm mini stereo jack (unbalanced), or (2) RCA female (white = L, red = R)
  • Impedance: 12.5k ohms, balanced, DC coupled; 25k ohms, unbalanced, DC coupled
  • Maximum level: +19.5dBu, (balanced or unbalanced) @ stated %THD+N
  • Input gain adjustment: -15dB to +9dB, adjustable per input via RS-232 or front panel
f. Audio throughput
  • Gain: -15dB (min.) to +9dB (max.) adjustable in 0.5dB increments
  • Frequency response: ±0.05dB @ 20 Hz to 20 kHz
  • THD + Noise: < 0.03% @ 1 kHz at rated maximum output drive
  • S/N: > 90dB, 21dBu output
  • Adjacent input crosstalk: > 80dB @ 1 kHz
  • Stereo channel separation: > 90dB @ 1 kHz
  • CMRR: > 75dB @ 20 Hz to 20 kHz
g. Audio output
• Number/signal type: (1) line-level stereo, balanced/unbalanced
• Connectors: (1) 3.5 mm captive screw terminal, 5 pole
• Nominal output level: +0dBu, unbalanced
• Maximum output level: +6dBu, unbalanced
• Impedance: 50 ohms, unbalanced; 100 ohms, balanced
• Gain error: ±0.1dB channel to channel
• Drive (Hi-Z): > +21dBu, balanced or unbalanced at stated %THD+N
• Drive (600 ohm): > +15dBm, balanced or unbalanced at stated %THD+N

7. Control Specifications:

a. Remote-Switcher
• Serial control port: RS-232, 9-pin female D connector, dual port
• Baud rate and protocol: 9600, 8-bit, 1 stop bit, no parity
• Serial control pin configurations: 2 = TX, 3 = RX, 5 = GND,
• Contact closure: (1) 3.5 mm, 10-pole captive screw connector
• Contact closure pin configurations: 1 = input 1; 2 = input 2; 3 = input 3; 7 = input 7; 8, 9, 10 = GND
• Remote keypad control: (2) 3.5mm captive screw connectors, 5 pole
• Program control:
  – Control program for Windows ®
  – Standardized ASCII command set

b. Control — room relay
• Number/type: 2 momentary or latching relays
• Connectors: (2) 3.5 mm captive screw connectors, 5 pole
• Contact rating: 24V, 1 A
c. Control — projector
   • RS-232 projector control port: (1) 3.5 mm captive screw connector, 10 pole
   • IR projector control port: (1) 3.5 mm captive screw connector, 5 pole
d. Control — peripheral equipment
   • IR Transport connector: (1) 3.5 mm captive screw connector, 5 pole

8. Mechanical Specifications:
a. Power: 100VAC to 240VAC, 50/60 Hz, 60 watts, internal, auto-switchable
b. Temperature/humidity:
   • Storage -40 to +158F (-40 to +70C) / 10% to 90%, non-condensing
   • Operating +32 to +104F (0 to +40C) / 10% to 90%, non-condensing
c. Rack mount: Yes, with included brackets
d. Enclosure type: Metal
e. Enclosure dimensions: 3.5" H x 17" W x 9.5" D (2U high) (front panel is 19" wide)
f. Shipping weight: 17 lbs (7.7 kg)
g. Approvals: UL, CUL, CE

9. The specified unit will be the Extron System 7SC Switcher/Scaler, furnished with IR 70 Remote Control, 50’ Universal Control Cable, 9-pin male-male gender changer, Rackmount Kit, and appropriate IR Emitter (and cable) for projector control (or equal product/s by Inline or Analog Way, if suitably configured).

10. The Selected Firm will install the appropriate IR Emitter at the projector mounting location and employ the IR learning capability of the
Switcher/Scaler (or downloaded IR files) to provide front-panel, wired-
remote-panel and IR Remote control of selected projector functions. The
Selected Firm will coordinate the selection of these functions with the
Multimedia Consultant and the University’s Project Coordinator.

11. Unit will also be furnished with (1) Extron SCP 200 (White) Hard-Wired
Control Pad (or equal by other manufacturer), which will be custom-
mounted by the Selected Firm on the front of the Media Cabinet, to allow
access to the Switcher functions and IR port without opening the Media
Cabinet doors. The Selected Firm will be responsible for all installation,
mounting hardware, cable, and custom fitting or cabinet modifications to
accommodate this Remote. Provisions were not made by the University
for mounting this item in the Media Cabinets when they were being
designed and constructed, as the product was not available at that time.

12. Acceptable “equals” will include comparable products from other
manufacturers that either meet or exceed the intent of these specifications.
Any substitutions must meet the fit, form, and function of the specified
product.

D. Classroom VCR (one required)

1. Furnish and install one S-VHS VCR. VCR will be capable of playing
both standard VHS tapes and S-VHS tapes. Units will be mounted in the
equipment rack section of the Media Cabinets.

2. The product specified incorporates the following features.
   a. Unit will output S-VHS, regardless of source tape format.
   b. Unit must be capable of RS-232 serial remote control for potential
      future use.
   c. Unit will include a “shuttle/jog” wheel for ease of tape handling
      and searching.

3. The specified unit will be the JVC SR-S365U, or equal (or current model).

4. Acceptable “equals” will include comparable products from other
manufacturers that either meet or exceed the intent of these specifications.
Any substitutions must meet the fit, form, and function of the specified product.

E. Classroom Visual Presenter (one required)
   1. Furnish, test and demonstrate one High-Resolution Visual Presenter, with all necessary cables, for classroom use. University will furnish cart and security device, as necessary.
   2. The product specified incorporates the following features:
      a. True XGA resolution plus NTSC/PAL video output
      b. 1/3" 850,000 (1,077 x 788) pixels Progressive-scan CCD
      c. Analog RGB (XGA-75Hz) output
      d. Converts the external analog RGB input into video output
      e. 15fps image transfer
      f. High-quality 10x optical zoom
      g. Auto focus
      h. Wireless remote control
   3. Performance Specifications:
      a. Input/Output
         • Input selection: 3 modes (Internal/RGB1/RGB2)
         • RGB input: Mini DSUB 15 pin connector female
         • RGB output: Mini DSUB 15 pin connector female
         • C-Video output: RCA Pin jack
         • S-Video output: Mini DIN 4-pin connector
      b. Lighting
         • Upper lighting unit: Built-in, 6W fluorescent lamp x2
         • Baselight: Built-in
      c. Optics
         • Lens: 10x (f=5.8 ~ 58mm) F2.8
         • Shooting area: Max 13.8” x 10.2”
         • Zooming: Powered (with double speed function)
• Focusing: Auto/Manual
• Iris: Auto (with level adjustment)/Manual
d. Other
• RS-232C control terminal: DSUB 9P
• DC output DC 12 V (Max 0.9A)
e. Picture
• Image pick-up element: 1/3” progressive scan CCD
• Total picture element: 1,077(H) x 788(V)
• Effective picture element: 1,024(H) x 768(V)
• Sync. System: Internal
• Horizontal resolution:
  – More than 600 TV lines (RGB output)
  – More than 400 TV lines (Video output)
• Analog RGB output: XGA (1,024 x 768@75Hz), VESA
• C-video output: NTSC/PAL compatible
• S-Video output: NTSC/Pal compatible
• White balance: Full-auto
• Gamma selection: Built-in (1.0/0.6)
• Video output selection: Built-in (NTSC/PAL)
• Flicker correction: Built-in (60/50Hz switch selection)
• Shooting speed: 15 frames/sec.

4. Mechanical Specifications
a. Carrying handle: Built-in
b. Dimensions:
  • Set-up: 27.6 x 21.3 x 24.6 in
  • Folded: 15.7 x 26.0 x 6.6 in
c. Weight: 22 lbs
d. Power source: AC, 120V, 60Hz
e. Power consumption: 40W
5. The specified unit will be the Elmo HV-5000XG, or equal. Note that “equal” products must have a minimum of 1024x768 graphics output resolution and a “frame rate” of no less than 15 fps.

6. The unit will be furnished with a suitable 15’ VGA Cable, for connection to the separate Computer Interface Panel or the front-panel RGB input of the Switcher/Scaler.

7. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.

F. Classroom Broadband Cable Tuner (one required)

1. Furnish and install one Broadband Cable AM/FM/TV/Weather Radio Tuner, for connection to the Video Switcher/Scaler as a signal source. The University will provide the Broadband Cable feed.

2. The specified unit is a control-network-optimized high-performance AM/FM/TV and Weather Radio tuner. The control-network system can store virtually unlimited radio station and television (TV) channel presets. The presets are available for recall through remote-keypads, remote control devices, and/or touchpanels. The frequency of the radio station or TV channel being received is displayed on the specified unit and can also be displayed on a suitable touchpanel. The specified unit also receives monophonic (mono) AM broadcasts, stereo or mono FM and mono Weather Radio broadcasts. The TV band provides reception of channels 1 to 125. The video may be connected to video inputs, switching devices and/or to any commercial TVs or monitors that have composite video input connectors.

3. The specified unit will be fully operable from front-panel controls, without the need for a remote-control system.

4. Performance Specifications:
   a. AM Tuner Specifications
• Sensitivity: 55µV
• Alternate Channel Selectivity: 55dB
• Image Rejection: 35dB
• IF Rejection: 60dB
• Output Level, Line @ 10k ohms AM/FM: 1VRMS

b. FM Tuner Specifications
• Input Connector ("F" Type Coaxial): 75 ohms
• Usable Sensitivity, Mono: 11 (dBf)
• Signal to Noise Radio@65 dBf, mono/stereo:
  74dB/70dB
• Selectivity, Adjacent / Alternate Channel:
  5dB/65dB
• IF Rejection: 100dB
• AM Rejection: 55dB
• Stereo Separation: 45dB
• THD @1KHz mono/stereo (%): 0.05

c. Radio Data Systems (RDS)
• Purely Digital RDS, FM encoded
• Data available to control system

d. TV Tuner Specifications
• Input Connector: ("F" Type Coaxial): 75 ohms
• Frequency Range: 55 to 802MHz
• Off air TV Channels: 2 to 69
• CATV Cable Channels: 2 to 125
• Stereo Separation: 35dB
• THD @1Khz L+R (%): 0.2
• Sensitivity: –20 to +20dBmV
• Video Level @75 ohms: 1VRMS
• Output Level, Line @10k ohms: 1VRMS
• SAP: Secondary Audio Program

e. NOAA Radio Specifications
• Input Connector: (TV “F” Type Coaxial): 75 ohms
• Frequency: 162MHz
• THD @1KHz L+R (%): 0.2
• Sensitivity (mono only): -20 to +20 dBmV
• Output Level, Line @ 10k ohms: 1VRMS

5. Mechanical Specifications:

a. Indicators
• PWR: Indicates power supplied to the unit
• NET: Indicates communications between the system and specified unit
• SIG: Display indicates strength of incoming signal
• MONO: Indicates that mono output is activated in FM band
• SAP: Indicates that secondary audio program selector is activated
• PRE: Indicates that manual preset mode is activated
• TUNE: Indicates that manual tuning mode is activated
• SRCH: Indicates that manual search mode is activated
• AM: Indicates unit is set for AM reception
• FM: Indicates unit is set for FM reception
• WX: Indicates unit is set for weather radio reception
• TV: Indicates unit is set for TV reception

b. Buttons
• TUNING: Tunes signal up or down
• BAND: Selects either AM, FM, weather radio, or TV
• MONO: Selects mono output in FM band
• MODE: Selects either local preset, manual tuning, or search mode

c. Connectors
• 12VDC .5A: Power socket connector used to supply power via an external AC power pack
• NET: (2) 6-position RJ11 modular jacks are pass-through connectors that are also used to connect the unit to the control system
• AUDIO (L+R): (1) RCA jack pair; audio outputs
• VIDEO: RCA jack; video output
• AM: 2-position connector; connects to AM antenna
• FM: F coaxial cable; connects to FM antenna
• TV: F coaxial cable; connects to TV antenna
d. Power Requirements: 24VDC, 170 mA; network power
e. Dimensions: 1.70”/4.23cm (H) x 7.07”/17.95cm (W) x 6.32”/16.06cm (D)
f. Weight: 2.3lbs./1.05kg

6. The specified unit will be the Crestron ST-TUNE, or equal. The unit will be connected to the specified Multimedia Controller, for remote monitoring or operation, as required. Units not capable of interfacing to the Multimedia Controller, with complete control and monitoring functionality, will not be acceptable.

7. The unit will be furnished with suitable “cable” or “wire”-style antennas for AM and FM reception. These antennas will be of basic design, with no special gain circuitry, and will be mounted to the interior of the Media Cabinets, as appropriate. High-performance is neither requested nor required.

8. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.

III. Video Wire and Cable
A. Video wiring, RGB, NTSC, S-VHS, or other, will be run using specifically designed High-Resolution Cables. The use of multi-core cables is encouraged wherever practical. For this project, the use of Plenum-Rated cable is required.

Suggested cable manufacturers will include Extron, Inline, and Covid. Other manufacturers products will be acceptable if they meet the performance criteria of “High-Resolution Coax Cables,” as exemplified by the products from the manufacturers noted herein.

B. All conduits used by the Selected Firm will be left with a pull-string installed.

C. All cable “home runs” must be continuous, with no splices.

IV. Video System Installation

A. General

1. Video System Installation will comply with all provisions of Attachment 3a, Sound Systems, Section VIII, Sound System Installation, Sections A, B, and C, substituting “video” for “sound” where applicable.

2. Wherever possible, within the scope of the hardware proposed, if a choice exists between using the S-Video or Composite Video outputs of a signal device, preference will be given to S-Video.

3. All video signal lines will be properly terminated, as required by the equipment involved.

4. The Selected Firm must furnish all portable cables required for full and complete operation of systems.

5. The Selected Firm will label all devices, panels, jacks, and controls as to their functionality. Labels will be internal (insert labels for buttons, and similar), directly engraved, silk-screened, or engraved on Lamacoid-type permanent-adhesive labels. The Selected Firm will coordinate the labeling, choice of names or icons, and placement with the Multimedia
Consultant and the Project Coordinator for ITC. No labels will be applied or finalized without signed approval by the University’s Project Coordinator, or their designated representative. It is the desire of the University to keep the naming or identification of devices, jacks, and controls as intuitive and simple as possible.

The use of “tape” style labels will not be acceptable for this project.

V. Proof-of-Performance and Testing

A. For Items “B,” “C,” and “D” that follow, the Selected Firm will be responsible for performing all of the required tests, on all of the equipment in the systems.

B. The Selected Firm will, in the presence of the Multimedia Consultant, University’s agent and/or any designated representatives of University, demonstrate all items of the video systems herein specified, showing them to be fully functional and capable of performing the tasks required. A checklist will be completed and initialized by University and the Multimedia Consultant certifying acceptance or rejection of performance, for each item.

C. Proper signal levels from all designated or furnished signal sources will be verified using suitable Test Equipment and/or test source material. The Selected Firm will furnish all test equipment and/or test signal sources required. Test Signals covering the entire spectrum of expected usage (resolutions, scan rates, etc.) will be sent to the Video Projector to verify proper operation, registration and color setup. A checklist will be completed and initialized by University and the Multimedia Consultant certifying acceptance or rejection of performance, for each item, with each signal type.

D. All tests will be performed in the presence of the Multimedia Consultant and University’s agent, or designated representatives of University. Any equipment
that does not meet specified performance criteria will be corrected or adjusted on-site if possible to establish compliance. Equipment that cannot be made to perform according to specification will be removed and replaced by the Selected Firm at no additional charge to University.
VI. Scope

A. Description

1. This section includes all Audio-Visual Equipment, not otherwise specified in Attachments 6a and 6b. Included in this section will be a Projection Screen, a Wireless Keyboard for use with University-furnished computers, a Standard Overhead Projector, System Remote AC Turn-On & Surge Suppressor, and a Wireless Mouse w/Y-Mouse Adapter as noted in the specifications and on the Drawings.

2. Peripheral Equipment and Accessories, as noted in the specifications and on the Drawings.

3. The Selected Firm is responsible for furnishing fully operational systems to University on completion of this project. Items not specifically listed in this section, but required for proper operation of the systems herein described, will be the responsibility of the Selected Firm to provide as part of the package.

B. Performance Criteria

The Audio-Visual Equipment herein specified is a basic guideline, indicating minimum required functionality and performance criteria. Firms must satisfy the fit, form, and function of the basic designs, but may present viable alternative approaches as their primary bid. Such presentations must be accompanied by a complete proposed Bill of Materials (all major items), and System Risers and/or line drawings indicating system connectivity, and verification that all basic design criteria are being satisfied.

C. Work By Others

Certain provisions have been made for conduit, junction boxes, furniture cutouts, and AC power in the existing General Construction Contract. It will be the
responsibility of all firms to review these provisions thoroughly. Any additional work, either conduit, cutting, patching, etc. necessary to install the firm’s proposed system, and return an area to it’s current finished state, will be the sole responsibility of the firm, and will be included in their price.

VII. Standard Classroom Audio-Visual Equipment

A. Projection Screens (one required)

1. Furnish and install one Wall-mounted Manual Projection Screen. Screens will nominally be wall-mounted, as high as possible. Final mounting will be as approved by Multimedia Consultant and University Architect.

2. The product specified incorporates the following features.
   a. Screen will be furnished in AV Format. The specified unit will include a viewing area of 96” H. x 120” W. (Note: The Multimedia Consultant and the University are aware that under normal use there “may” be a white border on either side of the projected image. The screen size specified is to allow for ease in accommodating the future HDTV screen format.)
   b. Case of 22 ga. steel, flat back design, with embossed, baked-on Plastisol finish in gray (standard) or white (optional).
   c. 16 ga. endcaps finished to match case, with integral roller brackets, concealing roller ends. Furnished with matching universal mounting brackets.
   d. Viewing surface of Matte-White fabric (or equal), mounted to one-piece rigid steel roller with FabrikLok spline/groove construction to prevent separation of fabric from roller. Viewing surface flame and mildew resistant. Bottom of viewing surface securely mounted on tubular steel slat, with ends protected by vinyl caps.

3. The specified unit will be a Draper Model Luma 2, AV Format (96” x 120”), with Matte-White viewing surface, and will include all necessary mounting hardware.
4. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product. Alternate manufacturers “may” include Stewart and DaLite, providing the above requirements are met.

B. Wireless Keyboards (one required)

1. Furnish one Wireless Computer Keyboard, to be used with University-furnished computers. Furnish one Apple Macintosh Adapter with each Keyboard package.

2. The product specified incorporates the following features.
   a. Communication Radio frequency technology
   b. 50 foot operating range
   c. 4 switch-selectable channels for multi-unit installations
   d. 49mHz frequency
   e. Keyboard Durable and compact with 83 full-size keys
   f. Embedded numeric keypad for 101 key compatibility
   g. 100 hours operation (nominal) on 4 AA alkaline batteries (included)
   h. Works with standard AT keyboard driver
   i. Keyboard dimensions 17.3 x 6.3 inches
   j. Mouse Touchpad Fingertip-controlled movement and clicking
   k. Left and right mouse buttons
   l. Works with standard mouse drivers
   m. Receiver Integral 5 foot cable with keyboard and mouse connectors
   n. 5-pin keyboard and 9-pin serial adapters
   o. Game port cable
   p. Receiver dimensions 4.6 by 6.3 inches

3. The specified unit will be the Wireless Surfboard, as manufactured by Wireless Computing, Inc., with the Apple Macintosh Adapter included.
4. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.

C. Wireless Mouse w/ Y-Mouse Keyboard/Mouse Adapter
1. Furnish one Wireless Mouse System with Y-Mouse Keyboard/Mouse Adapter, to be used with University-furnished computers.
2. The Wireless Mouse will use the existing mouse driver - Microsoft, Logitech, Apple Macintosh, or Power PC.
3. The Y-Mouse product will be for PC use, not Apple. This unit will allow the wireless keyboard and the wireless mouse to share a common laptop or desktop PS/2 port.
4. The wireless mouse product specified incorporates the following features:
   a. Wireless design
   b. Revolutionary gyroscopes
   c. Natural gestural control
   d. RF multi-channel radio
   e. No software drivers required
   f. PC, PS/2 and Mac
   g. Two AA batteries
5. The specified unit will be the GyroPoint Pro II, as manufactured by ixmicro, Inc. and the Y-Mouse product will be the Keyboard/Mouse Adapter, as manufactured by P.I. Engineering, Inc.
6. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.
D. Remote AC Turn-On System & Surge Suppressor (1 each required)

1. Furnish and install one Remote AC Turn-On System (custom or pre-manufactured), to be mounted internal to the Media Cabinets, with an external On/Off control and power indicator. Furnish one Series-Mode Surge Suppressor for internal use in the Media Cabinet. These systems will power on or off equipment in the Media Cabinet, and protect sensitive electronics from power transients, as determined in consultation with ITC and the Multimedia Consultant.

2. Equipment will be powered up and down in a manner that does not introduce loud transients or damaging spikes in any of the equipment.

3. The Selected Firm will provide all internal AC wiring strips or outlet devices (UL or approved testing lab certification required), as required by the equipment complement furnished. The University will provide the 120 VAC circuits internal to the Media Cabinet, as 20 A. duplex receptacles, for use by the Selected Firm.

4. The specified Series-Mode Surge Suppressor will be the Surge-X Model SX20-iR2, or alternate choice from the Surge-X product line. The Remote AC Turn-On System may be combined with the Surge Suppressor through the use of the Surge-X SX2120-SEQ, at the discretion of the Selected Firm. The use of Shunt-Mode Surge Suppressors will not be acceptable.

E. Standard Overhead Projector

1. Furnish one Standard Overhead Projector with lamp-changer. University will furnish cart and security device.

2. The product specified incorporates the following features:
   a. Approx. 1700 Lumen output, or greater
   b. 10.5” x 10.5” stage
   c. Lamp Changer feature
   d. Variable-focus lens, 12.2”-14.2”
      Note: Long-throw capability (14” focal-length or greater, required)
   e. All-metal design.
3. The specified unit will be an Eiki Model 3890 Stationary Overhead Projector (or current model, if applicable), or equal.

4. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product. Alternate manufacturers “may” include Buhl, Dukane, Elmo, or 3M, providing the above requirements are met.

VIII. Audio-Visual Equipment Installation

A. General

1. The Selected Firm will be responsible for installation of the Projection Screens in all classrooms. Multimedia Consultant and Architect will approve exact location, mounting method, and mounting height prior to final installation. Locations are as shown on the University’s General Contract drawings.

2. The Wireless Keyboard, Wireless Mouse, Y-Mouse Adapter and Overhead Projector are “furnish-only” items, and will be delivered to the designated ITC representative. They will, however, be subject to the “Proof-Of-Performance” testing, as noted below.

3. The Selected Firm will label all devices, panels, jacks, and controls as to their functionality. Labels will be internal (insert labels for buttons, and similar), directly engraved, silk-screened, or engraved on Lamacoid-type permanent-adhesive labels. The Selected Firm will coordinate the labeling, choice of names or icons, and placement with the Multimedia Consultant and the Project Coordinator for ITC. No labels will be applied or finalized without signed approval by the University’s Project Coordinator, or their designated representative. It is the desire of the University to keep the naming or identification of devices, jacks, and controls as intuitive and simple as possible.
The use of “tape” style labels will not be acceptable for this project.

IX. Proof-of-Performance and Testing

A. For Items “B,” “C” and “D” that follow, the Selected Firm will be responsible for performing all of the required tests, on all of the equipment furnished.

B. The Selected Firm will, in the presence of the Multimedia Consultant, University’s agent and/or any designated representatives of University, demonstrate all equipment items herein specified, showing them to be fully functional and capable of performing the tasks required. A checklist will be completed and initialized by University and the Multimedia Consultant certifying acceptance or rejection of performance, for each item.

C. All tests will be performed in the presence of the Multimedia Consultant and University’s agent, or designated representatives of University. Any equipment that does not meet specified performance criteria will be corrected or adjusted on-site if possible to establish compliance. Equipment that cannot be made to perform according to specification will be removed and replaced by the Selected Firm at no additional charge to University.

D. The Wireless Keyboard, Wireless Mouse, and Y-Mouse Adapter are “as requested by the University ITC staff.” Units will be shown to be operational, but compatibility with University-furnished computers will be the responsibility of ITC, and not the Selected Firm.
Attachment 6d
Multimedia Control Systems

I. Scope

A. Description

1. This section includes all Multimedia Control Systems equipment. Included in this section will be a System Controller, Ethernet interface (where specified), Control Panels (where specified), and Interface Units or Modules (as required) in the quantities as noted in the specifications and on the Drawings.

2. It is the intent of this section to provide LAN or WAN (or Internet, if selected at some point in the future) access to key elements of the Sound, Video, and Audio-Visual Systems described elsewhere in this document. Such access will include remote control (for operational or Help Desk applications), system diagnostics (if applicable) and preventive maintenance information. TCP/IP will be used as the communications protocol across the network, and standard Web Browsers will be the means of accessing the GUI (Graphic User Interface).

3. Peripheral Equipment and Accessories, as noted in the specifications and on the Drawings.

4. The Selected Firm is responsible for furnishing fully operational systems to University on completion of this project. Items not specifically listed in this section, but required for proper operation of the systems herein described, will be the responsibility of the Selected Firm to provide as part of the package.

B. Performance Criteria

The Multimedia Control Systems herein specified are basic guidelines, indicating minimum required functionality and performance criteria. Firms must satisfy the fit, form, and function of the basic designs, but may present viable alternative
approaches as their primary bid. Such presentations must be accompanied by a complete proposed Bill of Materials (all major items), and System Risers and/or line drawings indicating system connectivity, and verification that all basic design criteria are being satisfied.

The means of implementing the “TCP/IP-based Network Control” portion of this section will be considered of primary importance - not only in terms of the ease and capabilities of the system implementation and operation, but also in terms of the robustness, flexibility, and expandability of the proposed methodology and hardware - as it may form the core of a new “support mechanism” employed by ITC. Consideration will be given to additional “support documentation” which may be included by firms submitting proposals, that may include written references for the proposed system, suggested long-range plans of development, or any other additional information the firm may wish to submit to the University in this regard.

C. Work By Others
Certain provisions have been made for conduit, junction boxes, furniture cutouts, and AC power in the existing University Renovation Work. It will be the responsibility of all firms to review these provisions thoroughly. Of specific note should be that the various wall and cabinet-mounted junction boxes and conduit runs are being furnished and installed by the University, and are as noted on those drawings and specifications. Any additional work, either conduit, cutting, patching, etc. necessary to install the firm’s proposed system, and return an area to it’s current finished state, will be the sole responsibility of the firm, and will be included in their price.

II. Multimedia Control System Equipment

A. Integrated Controller (one required)
1. Furnish and install one Integrated Multimedia Controller. This unit will be mounted in the equipment rack section of the Media Cabinets, and will be used to access, monitor, and/or control other designated hardware in the rack or classroom.

2. The specified product will be a high performance, integrated control system with dynamic expansion capabilities.

3. An LCD control center and LED indicators will provide access to virtually all system functions - without using a PC. System status, COM port status and card slot functions will all monitored from the front panel.

4. DPA (Direct Processor Access) (or as furnished by the proposed product) will provide a direct link to any LAN or Internet connection via Ethernet. The DPA card slot (or as furnished by the proposed product) will accommodate 10BaseT, 100BaseT and future communication protocols like ATM and Firewire. Each control system will have its own user-assigned IP address, seamlessly integrating with a computer network.

5. The specified product incorporates the following features.
   a. Utilize a real time, event driven, multi-tasking, multi-threaded operating system with a distributed processing architecture.
   b. Support internal high-speed data communications port with Direct Processor Access (DPA) (or as furnished by the proposed product).
   c. Support 10BaseT Ethernet communications with DPA communication and future 100BaseT Ethernet, ATM, Firewire communications.
   d. Support TCP/IP and SNMP communications with Direct Processor Access (or as furnished by the proposed product) (communication through control system bus link will not be accepted).
   e. Support user assigned IP address.
   f. 100% compatible with all PC, Mac, Unix, etc LANs.
   g. Full API (Applications Interface) directly to control system via TCP/IP for integration with Visual Basic, C++, Java, etc.
applications. API support through included ActiveX module and/or Dynamic Link Library (.DLL).

h. 2 line by 40-character front panel LCD communication center (or as furnished by the proposed product). Display will provide the following information without the use of a computer:
   • View control program (name, date, creator).
   • Manually control any function (I/O, relays, etc).
   • Report network devices.
   • Report error messages.
   • User definable functions – program LCD menu with dealer name, telephone number, control functions (use like a touch panel).

i. Front panel LED display panel for status indication of every port and card slot.

j. Network Analyzer to continuously monitor the integrity of the network for wiring faults, marginal communication performance, and network errors – all information is viewable.

k. Integrated three-slot card cage to support any mix of control cards for IR, RS-232/422/485, relay, digital I/O, analog input, volume, MIDI.

l. Internal power supply.

m. Front and rear programming ports.

n. Support RS-485 token passing local area network (LAN) with data communication for a minimum distance of 5000 feet.

o. Support a minimum of 253 LAN devices simultaneously.

p. Control system will support object-oriented logic based programming language or a C-like language programming language or both. If available, both programming types are to be supported to run simultaneously and integral to each other.
q. Control system manufacture will supply Windows-based graphical programming software for drag and drop object oriented programming for the control system operation.

r. Control system manufacture will provide Windows-based graphical programming software, which is self-documenting in that it generates a symbolic flow diagram printout from the system program.

6. Functional / Mechanical Specifications:
   a. Connectors (or as furnished by the proposed product)
      - NET: (1) 6-wire RJ-type connector and (1) 4-pin male connector; for expansion to network peripherals; 50W maximum load depending on expansion slot load
      - RELAYS: Furnishes (8) normally open, isolated relays; each relay is rated 1A, 30VAC/DC; MOV arc suppression across contacts for use with “real world” loads
      - INPUT/OUTPUT: Furnishes (8) programmable analog inputs and digital inputs/outputs; digital outputs offer 250mA sync from maximum 24VDC; catch diodes for use with “real world” loads; digital inputs rated for 0-24 VDC, 20K ohms input impedance, logic threshold 1.25VDC; analog inputs rated 0-10VDC, protected to 24VDC maximum, 20K ohms input impedance; programmable 2K ohms pullup resistor (per pin, software reference to GND or closure to GND)
      - IR/Serial: Furnishes (8) serial outputs for (IR), RS-232 or serial interface; signal (S) and ground (G) pins; infrared output up to 1.2MHz
      - COM: Furnishes (6) bidirectional serial ports for RS-232, RS-422 or RS-485 communication with hardware and software handshaking; speeds up to 230,400 bps
• COMPUTER: (2) one per front and rear panel, 9-pin DB9 female connector for programming with a PC; modem compatible; not included

• Expansion Slots
  – DPA: Direct Processor Access expansion slot for optional local area network (LAN) interface card (or as provided for by proposed product); supports 10BaseT Ethernet card; may require field installation and has (1) 8-wire RJ45 connector for communication access
  – Other (1-3): (3) open “card cage” slots accept any network-interfaceable control cards

b. Indicators (or as furnished by the proposed product)
• PWR: Indicates power supplied to the unit
• NET: Indicates activity within the system
• ERR: Indicates an error message is available from the software feature buttons
• TXD (Ethernet): Indicates transmission of Ethernet data
• RXD (Ethernet): Indicates reception of Ethernet data
• LNK (Ethernet): Indicates attachment to Ethernet network
• ERR (Ethernet): Indicates Ethernet protocol error
• COM TX (A-F): Indicates transmission of data to serial devices attached to respective COM ports
• COM RX (A-F): Indicates reception of data from serial devices attached to respective COM ports
• COM RTS (A-F): Indicates when unit is ready to receive data from serial devices attached to respective COM ports
• COM CTS (A-F): Indicates when serial device on the respective COM port is ready to accept data from the unit
• IR-SERIAL (A-H): Indicates activity on respective IR/SERIAL line
• INPUT-OUTPUT (1-8): Indicates input voltage threshold for respective I/O port exceeded
• RELAY (1-8): Indicates respective relay is closed
• SLOT (1-3): Illuminates when card is inserted into slot; flashes when card is active
c. Fully programmable front panel "soft key" buttons (or as furnished by the proposed product)
d. Reset Buttons (or as furnished by the proposed product)
  • HW-R: Permits physical reset of system
  • SW-R: Restarts control program
e. Screen (or as furnished by the proposed product)
  • (1) Reverse mode (yellow and black) LCD back light; (2) lines (or as furnished by the proposed product)
  • (40) Characters per line (or as furnished by the proposed product)
f. Menu Function Buttons (or as furnished by the proposed product)
  • PANEL: Programmable interface offering command text, indirect text, and hierarchical screen structure
  • INFO: Displays system information including the loaded control program
  • MSG: Displays system alarms and error messages
  • TIME: Permits alterations to system date and time; access code required
  • COM: Monitors the transmission and reception traffic on each COM port
g. Menu Selection Buttons (or as furnished by the proposed product)
  • MENU: Returns screen display to menu default state
  • ^: Advances the current screen display
• V: Returns the current screen display to its previous state
• BKLT: Alters screen and LCD brightness

h. Power Requirements (or as required by the proposed product)
• 100-250VAC, 2.3A, 50/60Hz, internal universal power supply

i. Dimensions (or as defined by the proposed product)
• 3.47” / 8.81cm (H) x 19.00” / 48.26cm (W) x 8.43” / 21.41cm (D)

j. Weight (or as defined by the proposed product)
• 7.01lbs / 3.18kg

7. Additional Performance Specifications

a. The control system will support a variety of wireless communication modes, including one-way and two-way radio frequency and infrared transmission.

b. The control system will not require internal switch settings, jumpers, or adjustments. All circuit boards and modules must be directly replaceable without the need for pre-placement setup. Hardware parameters will be set and defined by software parameters in the system program. Circuit boards and modules requiring switch settings, jumper settings, or adjustments will not be accepted.

c. User connections to the control system will be clearly labeled as to function (relay, analog, volume controls, etc.), as well as information on connections such as +, -, and G. Array of numbers or letters that do not convey specific information will not be accepted.

d. The control system will support expansion enclosures or card cages, which may be located anywhere on the system network.

e. The control system manufacture will be capable of providing slide projector, motor control, power control, light dimming, RS-232,
The control system will use centralized software. Information required to interface with the various controlled equipment will be stored in the control systems central processing computer and downloaded to the appropriate control hardware. Control systems requiring EPROM changes or special factory programming are not accepted.

The control system manufacture will provide programming diagnostic software that indicates the program flow in real time as the system is being operated. This software will permit the isolation of specific program events for analysis.

The control system manufacture will provide end-user software based on menus and windows, which permit programming and editing of multiple real-time sequences. The control system includes a virtual tape recorder, which stores system functions in non-volatile memory. Sequences of functions are automatically recorded as they occur and may be played back causing functions to be activated in the same time sequence as they occurred. Sequences may be edited in non-real time and then played back.

The control system manufacture will provide end-user software for event scheduling. Functions or sequences of functions may be programmed to occur based on calendar dates, weekly, or monthly cycles.

The control system will include indicators, which signify system errors, power supply failure, and overload.

The specified unit will be the Crestron CNMSX-PRO, or equal.

Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications.
Any substitutions must meet the fit, form, and function of the specified product.

B. Ethernet Card for Integrated Controller (one required)
   1. Furnish and install one 10Base-T Ethernet Card in the Integrated Multimedia Controller, for connection to the University LAN/WAN. The University will furnish data port or cable (RJ-45) connected to the University network, for use by the Selected Firm.
   2. The specified product incorporates the following features.
      a. The Ethernet Card provides communication via LAN/WAN or Ethernet to any network control device via industry standard Internet Protocol. The Ethernet Card allows remote diagnostics and upgrades and access to the control system’s network analyzer, as well as the opening of TCP/IP sockets to communicate with other Ethernet-based systems, and the ability to activate any device connected to the system.
      b. The specified Ethernet Card is upgradeable in the field and connects directly to the Direct Processor Access (DPA) slot (or as provided by the proposed product) to provide direct, high-speed access from any controlled system device to the system processor.
      c. The specified Ethernet Card also contains a 2MB file system that is used as a Web Server. The Selected Firm (or the University -post Warranty) will use the manufacturer’s Control Panel/HTML software, or most any third-party HTML package (Microsoft® FrontPage™, Adobe® PageMill™, etc.) to create Java powered HTML pages. These pages can be stored onboard the Ethernet Card Web Server. Then, up to five users can simultaneously connect directly to the control system via most popular web browsers.
      d. The specified Ethernet Card eliminates the need for a dedicated PC or software licensing, and hosts the graphical user interface
securely inside the card. Moreover, all memory resources are maintained within the control system, resulting in no additional network overhead.

e. The specified Ethernet Card will support the following communications protocols:
   - TCP/IP communications
   - UDP/IP communications
   - Telnet communications
   - 10BaseT Ethernet interfaces

f. The Ethernet Card will incorporate an On-board RISC processor, to minimize processing overhead in the Integrated Controller.

g. The Ethernet Card will incorporate built-in security, as well as being able to take full advantage of any LAN-based security systems as implemented by the University.

3. Proposed Ethernet Card Systems that do not incorporate an integral Web Server capability, will require that the Multimedia Control System be furnished with any additional external hardware or licensing required to duplicate such features or capabilities, at no additional cost to the University. The use of Client-Side systems, and Distributed Architecture is recommended, but consideration will be given to all proposed systems, if suitably presented and documented.

4. The specified unit will be the Crestron CNX-ENET+, or equal.

5. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.

C. Wireless Control Panel and Receiver (one required)

1. For Rooms 217, furnish, program, and demonstrate one Wireless Touchscreen Controller with color display, rechargeable batteries, and
charging station. Each Wireless Touchscreen Controller will be furnished with a corresponding Wireless Receiver, suitable for connection to the Multimedia Controller network.

2. The specified Wireless Touchscreen Controller incorporates the following features.
   a. High-clarity LCD, 6" diagonal color Touchscreen display.
   b. Display technology will provide clear, easy-to-read graphics - even in the brightest ambient light.
   c. Touchscreen power options include rechargeable NiCad power pack or AC power supply.
   d. 320 x 240 resolution with a minimum size of 4.70" X 3.55".
   e. 256 Color (STN) Dot Matrix display.
   f. RF wireless one-way communication.
   g. Use of power pack slow charges installed batteries.
   h. Support an infinite number of user definable pop-up menus designed in a Windows software package.
   i. Display 3-D buttons with animated feedback.
   j. Support a minimum of 26 scalable and TrueType fonts.
   k. Support a minimum of 999 discrete button channels.

3. Wireless Touchscreen Controller Technical Specifications:
   a. Touchpanel will use high resolution liquid crystal display technology with a minimum pixel resolution of 320 X 240, and a minimum size of 4.70" X 3.55". Lower resolution or smaller size displays will not be accepted.
   b. Touchpanel will display a minimum of 256 colors.
   c. Touchpanel will display up to 256 color bit map graphics with dithering.
   d. Touchpanel will (one-way) communicate with control system via RF signals operating at 434 MHz (other frequencies available upon request). The control system and touchpanel will support the
uploading of all panel programming and display configuration over the four wire RS-485 Token Passing Local Area Network (LAN).

e. Touchpanel will slow-charge installed batteries when external DC power pack or network connection is made.

f. Touchpanel will utilize 12 VDC power. Touchpanels requiring the use of a local wired power source will not be accepted.

g. Touchpanel will support no less than 96 screens and 999 button functions. Touchpanel that supports less than 999 discrete button channels will not be accepted.

h. Touchpanel will support an infinite number of user definable pop-up menus. Pop-up menus will be designed in a graphical based software package. Systems limited to a predefined set of pop-up menus or systems requiring non-graphical design of pop-up menus will not be accepted.

i. Touchpanel will support a minimum of 26 scalable and TrueType fonts. Touchpanels limited to manufacturers defined fonts will not be accepted.

j. Touchpanel will support user definable compression of graphics.

k. Touchpanel will be provided with design software that is Windows-based and supports multiple projects open simultaneously, enabling true drag and drop project creation.

4. The specified Wireless Receiver incorporates the following features:

a. Unit will incorporate crystal-locked tuning.

b. The radio-frequency (RF) code packets will include error correction for high reliability reception.

c. The unit receives RF signals from one or more transmitters and translates them into commands for transmission over the multimedia control network.

5. Wireless Receiver Technical Specifications:

a. Radio Frequency (RF): 1-way; 434MHz
b. Communications Ports:
   • NET: (1) 4-pin male connector; to control network

c. LED Indicators
   • SIGNAL: Indicates reception of valid RF signal
   • ID SELECT: Indicates established communication between unit and network control system
   • NET PWR: Indicates 24VAC power supplied from control network


d. Enclosure: Black metal

e. Power Requirements: 24VDC network power

f. Dimensions: 7.28" / 18.49cm (H) x 3.25" / 8.25cm (W) x 1.35" / 3.44cm (D)

g. Antenna Length: 7.90" / 20.1cm

h. Weight: 1.1lbs / 0.5kg

6. The specified Wireless Touchscreen Controller will be the Crestron ST-1550C, furnished standard with ST-DS Docking Station/Charger and ST-BTP Battery Pack, or equal.

7. The specified compatible Wireless Receiver will be the Crestron CNRFGWA, or equal.

8. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.

D. Volume/Tone Control Card (one required)

1. For Room 217, furnish and install one three-channel digital volume and tone controller into the Integrated Multimedia Controller, using one of the available open “card slots”.

2. The Volume/Tone Control channels will be inserted in the audio system signal path as noted on the drawings. The Selected Firm will be
The specified Volume/Tone Control Card incorporates the following features:

a. The Volume/Tone Control Card provides volume/tone control interface with one stereo and one mono or three independent mono channels.

b. The card is a circuit board fastened to an aluminum faceplate. The card is manufactured to easily fit into an unoccupied slot in the specified Integrated Multimedia Controller.

c. The faceplate contains three identical male, 6-pin connectors, A, B, and C. Each connector provides balance/unbalance input and output ports as well as chassis ground. Silk screening is applied to the faceplate. Three supplied 6-position connectors can be wired and attached to connectors, A, B, and C.

4. Volume/Tone Control Card Technical Specifications:

   a. Volume Specifications of the Card (Per Channel)
      - Input Impedance: 10K or 600 Ohms
      - Output Impedance: 10 Ohms
      - Input: Balanced or Unbalanced
      - Output: Balanced or Unbalanced
      - Total Harmonic Distortion (THD): -90 dB
      - Hum and Noise (ref. 0 Dbv): -90 dB
      - Maximum Input Level (Flat Mode): 3.5V rms
      - Channel Separation: -90 dB
      - Attenuation Range (Excluding Mute): 0 to -76 dB (maximum)
      - Mute: -104 dB
      - Frequency Response: 8 Hz to 60 KHz (-3 dB minimum)

   b. Tone Specifications of the Card (Per Channel)
• Flatness (8 Hz to 60 KHz flat mode): +/- 0.2 dB
• Bass Gain Range (100 Hz): +/- 12 dB
• Bass Step Size (100 Hz): 2 dB
• Treble Gain Range (10 KHz): +/- 12 dB
• Treble Step Size (10 KHz): 2 dB

5. The specified unit will be the Crestron CNXVTC-3, or equal.
6. Acceptable “equals” will include comparable products from other manufacturers that either meet or exceed the intent of these specifications. Any substitutions must meet the fit, form, and function of the specified product.

E. Network Slide Projector Control Interface (2 Required)
1. Furnish and install two (2) Slide Projector Control Interfaces to be used with University-supplied Kodak Ektagraphic Slide Projectors.
2. The specified Interfaces will connect to the Multimedia Control System’s network, and will be available for remote access and control using the Local Control Panel, the LCD Panel on the Multimedia Controller, and the Web Browser GUI.
3. The Slide Projectors will be on (a) portable cart/s, rolled in to the rear of the Classroom. The Selected Firm will securely mount the Interfaces near or adjacent to the Slide Projectors on the University-supplied cart/s. The Selected Firm will mount two (2) Multimedia Control Network jacks on the Wiremold Raceway located at the rear of the room, and furnish suitable portable cords for connection from the Slide Projector Interfaces to the Raceway-mounted jacks. The Selected Firm will coordinate the selection of jacks and cabling with the Multimedia Consultant.
4. The Selected Firm will be responsible for all additional cabling, connectors, or interfaces (if required) to successfully integrate the Slide Projectors into the Multimedia Control System.
5. The specified unit will be the Crestron CNSC-1A, or equal.
F. Connection to External Devices
   1. The Multimedia Control System will communicate directly over its own internal network to any other Control Panels, Interface Units or Modules, as may be specified elsewhere in this document as required to be connected to the Multimedia Controller.
   2. The Selected Firm will be responsible for any cables, interfaces, or additional hardware to make any and all connections to such external devices, even if not specifically described or defined in this document.

G. GUI (Graphic User Interface) and System Programming
   1. The Selected Firm will be responsible for developing all Controller, Control Panel, Network, and Web Browser software code, as may be required for a full implementation of the system capabilities, as noted in this section.
   2. The Selected Firm will develop the Graphical Interface Pages for Local Control Panels (if applicable), the Web Browser HTML access, or both (if applicable). If both methods of Graphical Interface are used, the Web-based HTML pages will mirror the appearance, functions, controls, and feedback of the Local Control Panels.
   3. For all classrooms employing the Integrated Multimedia Controller, the Selected Firm will also mirror all control capability and functionality (less graphic displays) to the integral LCD Panel and “soft keys” on the front panel of the Controller.
   4. For Culbreth 217, the Integrated Multimedia Controller will provide control and diagnostic (if applicable) access to the functions of the specified Slide Projector Interfaces, the Volume/Tone Control Card, the Broadband Cable Tuner, the Video Switcher/Scaler and the Video Projector, using the RS-232 or network control capability of these devices. The Selected Firm will be responsible for providing all control cables, connectors, or interfaces which may be required to fully accomplish this task, whether directly specified in this document or not.
5. The Selected Firm will develop the HTML Control Pages in such a manner as to match the general appearance and functionality of the Control Pages that are to be developed for other classrooms that have a Local Control Panel. This general appearance will be carried throughout all of the classroom projects employing HTML Control.

6. The HTML Control Pages will be uploaded to the Local Web Server located on the Ethernet Card in the Integrated Multimedia Controller. The Selected Firm will coordinate the assignment of static IP addresses with the University’s ITC Department.

7. The Selected Firm will present a Preliminary Layout and Design of the Control Pages and the proposed Functionality of the Multimedia Control System prior to finalizing the programming and design. The Multimedia Consultant and representatives of the University’s ITC staff will review this Preliminary Layout and Design and make any recommendations or suggested changes as they may feel are required. The Selected Firm will not finalize the development of the Programming, Graphic Interfaces and the Control Functionality until their Preliminary Layout and Design has been Approved and Signed by the University’s Project Coordinator, or their authorized representative.

III. Multimedia Control Systems Equipment Installation

A. The Selected Firm will be responsible for installation of the Multimedia Control System in the classroom/s. The Multimedia Consultant and Architect will approve exact locations, mounting methods, or other design criteria prior to final installation, unless already specified in this section. Locations (if applicable) are as shown on the University’s General Contract drawings.

B. The Selected Firm will label all devices, panels, jacks, and controls as to their functionality. Labels will be internal (insert labels for buttons, and similar), directly engraved, silk-screened, or engraved on Lamacoid-type permanent-
adhesive labels. The Selected Firm will coordinate the labeling, choice of names or icons, and placement with the Multimedia Consultant and the Project Coordinator for ITC. No labels will be applied or finalized without signed approval by the University’s Project Coordinator, or their designated representative. It is the desire of the University to keep the naming or identification of devices, jacks, and controls as intuitive and simple as possible.

The use of “tape” style labels will not be acceptable for this project.

IV. Proof-of-Performance and Testing

A. For Items “B,” and “C” that follow, the Selected Firm will be responsible for performing operational tests, on all of the equipment furnished.

B. The Selected Firm will, in the presence of the Multimedia Consultant, University’s agent and/or any designated representatives of University, demonstrate all equipment items herein specified, showing them to be fully functional and capable of performing the tasks required. A checklist will be completed and initialized by University and the Multimedia Consultant certifying acceptance or rejection of performance, for each item.

C. All tests will be performed in the presence of the Multimedia Consultant and University’s agent, or designated representatives of University. Any equipment that does not meet specified performance criteria will be corrected or adjusted on-site if possible to establish compliance. Equipment that cannot be made to perform according to specification will be removed and replaced by the Selected Firm at no additional charge to University.
Attachment 6e
System Training and Documentation

V. Training

A. The Selected Firm will provide a minimum of 12 hours of on-site training for Room 217 on all of the systems furnished within the scope of this Contract. Allocation of these hours into time “blocks” will be at the discretion of the University.

B. The Selected Firm will allow the University to videotape any of the training sessions, if they so desire.

VI. Documentation

A. The Selected Firm will turn over five complete sets of “As-Built” Drawings to the University upon final acceptance of the installation, for each Classroom, as noted above. “As-Built” drawings must include all System Risers, Panel Drawings and Rack Layouts for all systems included in the classrooms. One additional set will be turned over to the Multimedia Consultant.

B. The Selected Firm will turn over five complete sets of all Manuals, Cut Sheets, and Service Documents to the University upon final acceptance of installation, for all major items of system hardware in the Classroom, as furnished by the Selected Firm. Sets will be suitably bound in large 3-ring binders, with section dividers and an Index. One additional set will be turned over to the Multimedia Consultant.

C. The Selected Firm will turn over five complete sets of all Programming Code, Graphic User Interface Pages, Sound System Programming, and any other software-based materials to the University upon final acceptance of installation, for all major items of system hardware in the Classroom, as furnished by the Selected Firm. Sets will be suitably archived onto CD or 3-1/2” disk (CD
preferred), labeled as to Project Name, Date, and Selected Firm, and turned over to the University upon final acceptance of installation. One additional set will be turned over to the Multimedia Consultant.
Attachment 6f
PROPOSAL FORM

(Firm will attach Bill of Materials for the classroom, showing all major hardware items by Make and Model No., and detailing any variances from this Specification, as herein required.)

BASE BID – Room 217

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials</td>
<td>$</td>
</tr>
<tr>
<td>Labor</td>
<td>$</td>
</tr>
</tbody>
</table>

CLASSROOM TOTAL $ 

(NOTE: This Total Price must include ALL labor, materials, fees, and any other necessary costs to provide fully operational systems in the classrooms, as specified. The University will not be responsible for any additional fees.)
Attachment 7
Drawings

AV-1a
AV-2a
AV-3a
AV-4a
AV-5a
AV-6a
AV-7a
NOTE: REFERENCE DESIGN ONLY - NOT FOR CONSTRUCTION
Local PC & Monitor Workstation by University (typ. of 5)

Computer Interface w/mon. out (By Contractor)

HD15 Jack (typ. of 6)

1x6 VGA/Audio Switcher

VGA Cable, portable

(to RS-232 port on Switcher/Scaler)

Computer Interface

(User Laptop)

 Buffered Local Monitor Out

S-Video Jack

Switcher/Scaler

Local Control Panel

Video Projector

Computer 1 In

IR Control

Audio Output to Audio Mixer

RS-232 Control

RS-232 Port

RS-232 from Control System

Cable Tuner

Control Network or RS-232

RS-232

Front Panel Inputs

(from RS-232 port on VGA Switcher)

Ruffner 223

NOTE: REFERENCE DESIGN ONLY — NOT FOR CONSTRUCTION
NOTE: REFERENCE DESIGN ONLY - NOT FOR CONSTRUCTION
VC = Control System Volume Controller

System Equalizer

From Audio Output of Switcher/Scaler

From Aux Line Input Jacks on Computer Interface

From Mic Jack on Computer Interface

Wireless Mic Receiver

Mic Level from XLR

Line Levels converted to Mic Level

Audio Interface Plate

Preamp Out

BTM-S

BTR-S

MPT-S

Spare

TLO-S

120 Volt AC from Remote On/Off

JBL Control 26CT

JBL Control 26CT

JBL Control 26CT

JBL Control 26CT

JBL Control 26CT

JBL Control 26CT

Line Output for Future Recording

NOTE: REFERENCE DESIGN ONLY - NOT FOR CONSTRUCTION
NOTE: REFERENCE DESIGN ONLY - NOT FOR CONSTRUCTION

Front Panel LCD Display & Controls

Slot 1
CNXVTC-3
To Amp Input
To Mixer Input "Switcher/Scaler"
Spare

Slot 2
(empty)

Slot 3
(empty)

Internal Relay Block
(8 relays)

Internal I/O Block
(8 I/O's)

Internal IR/Ser. Block
(8 outputs)

Internal COM Block
(6 Ports)

Control Network Port

DPA Slot
CNX-ENET+

Power On/Off Interface
Spare
Spare
Spare
Spare
Spare
Spare

VCR
Switcher/Scaler
Cable Tuner (if required)
Video Projector
Spare
Spare

LAN Connection

Cable Tuner

Campbell 107