ISSUED FOR BIDDING - 06-09-2011

PROJECT MANUAL FOR:

Enhancements for the:
WEST VIRGINIA STATE MUSEUM
Cultural Center
1900 Kanawha Blvd., East
Charleston, WV 25305

PREPARED BY:

R S L COMMERCIAL ARCHITECTURE

8927 Rossash Road
Cincinnati, OH 45236

513-891-9950 PHONE
513-891-9951 FAX

www.rslarch.com

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Project Directory

Owner:
West Virginia Division of Culture and History
The Cultural Center State Capitol Complex
1900 Kanawha Blvd., East
Charleston, WV 25305
Ph: 304-558-0220

Project Director/Owner's Representative:
Mr. Jim Hunt
Hunt Construction Services
1526 Andover Road
Charlotte, NC 28211
Ph: 704-400-5895
Fax: 704-333-0209

Architect:
RSL Commercial Architecture
8927 Rossash Road, Suite A
Cincinnati, OH 45236
Ph: 513-891-9950
Fax: 513-891-9951

A/V - Technology Director:
Mr. Rich Wagner
Raw Media Teknologies, LLC
770 West Bay Street
Winter Garden, FL 34787
Ph: 407-650-8815
Fax: 407-650-8814

Electrical Engineer:
KLH Engineers
1538 Alexandria Pike, Suite 11
Ft. Thomas, KY 41075
Ph: 859-442-8050
Fax: 859-442-8058

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AIA® Document A101™ – 2007

Standard Form of Agreement Between Owner and Contractor

where the basis of payment is a Stipulated Sum

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

AIA Document A201™–2007, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

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AIA® Document A101™ – 2007

Standard Form of Agreement Between Owner and Contractor

where the basis of payment is a Stipulated Sum

AGREEMENT made as of the day of in the year 2011
(In words, indicate day, month and year)

BETWEEN the Owner:
(Name, address and other information)

West Virginia Division of Culture and History
1900 Kanawha Boulevard, East
Charleston, WV 25305-0300

and the Contractor:
(Name, address and other information)

for the following Project:
(Name, location and detailed description)

Enhancements for:
West Virginia State Museum
Cultural Center
1900 Kanawha Boulevard, East
Charleston, WV 25305-0300
Project/RFQ # DCH09136

The Architect:
(Name, address and other information)

RSL Commercial Architecture
8927 Rossash Rd.
Cincinnati, OH 45236

The Owner and Contractor agree as follows.

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Deleted: 23
Deleted: September
Deleted: 2009
Deleted:
Deleted: R.B.S. Construction, Inc.¶
4300 1st Ave., Ste. 200¶
Nitro, WV 25143¶
WV Contractor Lic. # WV041980¶
Deleted: WVDCH Education Center
Deleted: Virginia
Deleted: of Culture and History¶
Deleted: Education
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2 THE WORK OF THIS CONTRACT

3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

4 CONTRACT SUM

5 PAYMENTS

6 DISPUTE RESOLUTION

7 TERMINATION OR SUSPENSION

8 MISCELLANEOUS PROVISIONS

9 ENUMERATION OF CONTRACT DOCUMENTS

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ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner.
(Insert the date of commencement if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)

The commencement date will be the date of receipt of the Owner's written notice to proceed.

If, prior to the commencement of the Work, the Owner requires time to file mortgages and other security interests, the Owner's time requirement shall be as follows:

Not applicable.

§ 3.2 The Contract Time shall be measured from the date of commencement.

§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than ( ) days from the date of commencement, or as follows:
(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)

Deleted: One hundred twenty five

Deleted: (

Deleted: 125

Portion of Work	Substantial Completion Date

, subject to adjustments of this Contract Time as provided in the Contract Documents.
(Insert provisions, if any, for liquidated damages relating to failure to achieve Substantial Completion on time or for bonus payments for early completion of the Work.)

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be ($), subject to additions and deductions as provided in the Contract Documents.

Deleted: eight hundred three thousand dollars

Deleted: 803,000.00

§ 4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:
(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

§ 4.3 Unit prices, if any:
(Identify and state the unit price; state quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price Per Unit
Not applicable		

§ 4.4 Allowances included in the Contract Sum, if any:
(Identify allowance and state exclusions, if any, from the allowance price.)

Item	Price
Not applicable	

ARTICLE 5 PAYMENTS

§ 5.1 PROGRESS PAYMENTS

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 5.1.
Payment will be made based on the Contractor's Application for Payment and according to WV Dept. of Purchasing procedures.

Deleted: **3** Provided that an Application for Payment is received by the Architect not later than the day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the day of the same month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than ( ) days after the Architect receives the Application for Payment.¶
(Federal, state or local laws may require payment within a certain period of time.)

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§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

.1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of ten percent (10%). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™–2007, General Conditions of the Contract for Construction;

.2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage of ten percent (10%);

.3 Subtract the aggregate of previous payments made by the Owner; and

.4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201–2007.

§ 5.1.7 The progress payment amount determined in accordance with Section 5.1.6 shall be further modified under the following circumstances:

.1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and
(Section 9.8.5 of AIA Document A201–2007 requires release of applicable retainage upon Substantial Completion of Work with consent of surety, if any.)

.2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201–2007.

§ 5.1.8 Reduction or limitation of retainage, if any, shall be as follows:
(If it is intended, prior to Substantial Completion of the entire Work, to reduce or limit the retainage resulting from the percentages inserted in Sections 5.1.6.1 and 5.1.6.2 above, and this is not explained elsewhere in the Contract Documents, insert here provisions for such reduction or limitation.)
1. Until the Work is fifty percent (50%) complete, the Owner will withhold as retainage 10% of the amount due the Contractor on account of progress payments. At the time the Work is fifty percent (50%) complete and thereafter, if the manner of completion of the Work and its progress remain satisfactory to the Owner and Architect, and in the absence of any other good and sufficient reasons, the Architect will, on presentation by the Contractor of Consent of Surety, authorize any remaining partial payments to be paid in full.
2. The full Contract retainage may be reinstated if the manner of completion of the Work and its progress do not remain satisfactory to the Owner and Architect, or if the Surety withholds its consent, or for other good and sufficient reasons.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 FINAL PAYMENT

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 12.2.2 of AIA Document A201–2007, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

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§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

Pending adherence to the Dept. of Purchasing procedures.

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 INITIAL DECISION MAKER

The Architect will serve as Initial Decision Maker pursuant to Section 15.2 of AIA Document A201–2007, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

§ 6.2 BINDING DISPUTE RESOLUTION

For any Claim subject to, but not resolved by, mediation pursuant to Section 15.3 of AIA Document A201–2007, the method of binding dispute resolution shall be as follows:
(Check the appropriate box. If the Owner and Contractor do not select a method of binding dispute resolution below, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.)

[ ] Arbitration pursuant to Section 15.4 of AIA Document A201–2007

[ ] Litigation in a court of competent jurisdiction

[X] Other *(Specify)*Per State of West Virginia, Supplementary Conditions to AIA Document A201-2007.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2007.

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2007.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2007 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

(Insert rate of interest agreed upon, if any.)

Not applicable

Deleted: § 8.2 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.¶

Deleted: per annum

§ 8.3 The Owner's representative:
(Name, address and other information)

Mr. Mark Lynch/Ms. Gloria Anderson
West Virginia Cultural Center
1900 Kanawha Blvd., East
Charleston, WV 25305-0300
Phone: 304-558-0220

Deleted:

§ 8.4 The Contractor's representative:
(Name, address and other information)

§ 8.5 Neither the Owner's nor the Contractor's representative shall be changed without ten days written notice to the other party.

§ 8.6 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 9.1.1 The Agreement is this executed AIA Document A101–2007, Standard Form of Agreement Between Owner and Contractor.

§ 9.1.2 The General Conditions are AIA Document A201–2007, General Conditions of the Contract for Construction.

§ 9.1.3 The Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
AIA A201-2007	General Conditions	6-9-11	

§ 9.1.4 The Specifications:
(Either list the Specifications here or refer to an exhibit attached to this Agreement.)
Title of Specifications exhibit:

§ 9.1.5 The Drawings:
(Either list the Drawings here or refer to an exhibit attached to this Agreement.)
Title of Drawings exhibit:

§ 9.1.6 The Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding requirements are not part of the Contract Documents unless the bidding requirements are also enumerated in this Article 9.

§ 9.1.7 Additional documents, if any, forming part of the Contract Documents:

.1 AIA Document E201™–2007, Digital Data Protocol Exhibit, if completed by the parties, or the following:

Not applicable

Deleted: Mr. Mark Stutler¶
R.B.S. Construction, Inc.¶
4300 1st Ave., Ste. 200¶
Nitro, WV 25143¶
Cell: 304-552-6816¶
Off: 304-755-2800¶
Fax: 304-755-3022¶

Deleted: 9-22-09

Deleted: WV RFQ # DCH09136

Deleted: WV RFQ # DCH09136

.2 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201–2007 provides that bidding requirements such as advertisement or invitation to bid, Instructions to Bidders, sample forms and the Contractor's bid are not part of the Contract Documents unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)

Deleted: WV RFQ# DCH09136, including Addendum #1

ARTICLE 10 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A201–2007.
(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A201–2007.)

Type of insurance or bond	Limit of liability or bond amount ($ 0.00)

Deleted: Refer to WV RFQ # DCH09136

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
Mr. Randall Reid-Smith Commissioner of Culture and History	
(Printed name and title)	*(Printed name and title)*

Deleted: Mr. Mark Stutler

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AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

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AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)
Enhancements for:
West Virginia State Museum
Cultural Center
1900 Kanawha Boulevard, East
Charleston, WV 25305-0300

THE OWNER:
(Name and address)
West Virginia Division of Culture and History
1900 Kanawha Boulevard, East
Charleston, WV 25305-0300

THE ARCHITECT:
(Name and address)
RSL Commercial Architecture, Inc.
8927 Rossash Rd.
Cincinnati, OH 45236

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11 INSURANCE AND BONDS
12 UNCOVERING AND CORRECTION OF WORK
13 MISCELLANEOUS PROVISIONS

Deleted: WVDCH Education Center
Deleted: of Culture and History
Deleted: Education Center
Deleted: Project/RFQ # DCH09136

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

§ 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or

the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other

facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 PERMITS, FEES, NOTICES, AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume

the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- **.1** allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- **.2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- **.3** whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be

required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate For Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION
Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may

be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

§ 6.2 MUTUAL RESPONSIBILITY

§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that

the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
.2 Unit prices stated in the Contract Documents or subsequently agreed upon;
.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

.4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

.5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2., for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;

.3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;

.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

.5 damage to the Owner or a separate contractor;

.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or

.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect,

stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the

Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- **.1** liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents; or
- **.3** terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

- **.1** employees on the Work and other persons who may be affected thereby;
- **.2** the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
- **.3** other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

.1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;

.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;

.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;

.4 Claims for damages insured by usual personal injury liability coverage;

.5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;

.6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;

.7 Claims for bodily injury or property damage arising out of completed operations; and

.8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction

of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's Consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or

otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

§ 11.3.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the

Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

§ 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

.1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 ARBITRATION

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 CONSOLIDATION OR JOINDER

§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an

additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.

State of West Virginia

Supplementary Conditions to AIA Document A201-2007
General Conditions of the Contract for Construction

The following Supplementary Conditions modify the General Conditions of the Contract for Construction, AIA Document A201, 2007 Edition. Where a portion of the General Conditions is modified or deleted by these Supplementary Conditions, the unaltered portions of the General Conditions shall remain in effect.

ARTICLE 1
GENERAL PROVISIONS

ANY PROVISION OF THE AIA DOCUMENT A101-2007 STANDARD FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR THAT CONFLICTS WITH THESE SUPPLEMENTARY CONDITIONS IS NULL AND VOID.

Add the following Section to Article 1:

§1.05 PARTY RELATIONS

§1.05 The Owner and their consultants, the Architect and their Consultants, and the Contractor and their Subcontractors agree to proceed with the Work on the basis of mutual trust, good faith and fair dealing.

§1.1 BASIC DEFINITIONS

§1.1.1 THE CONTRACT DOCUMENTS

§1.1.1 Delete the last sentence of this Section and substitute the following:

The Contract Documents also include the Bidding Documents (Advertisement or Invitation to Bid, Request for Quotations/Bids, Instructions to Bidders, Form of Proposal, Bid Bond and Sample Forms), Performance Bond, Payment Bond, Maintenance Bond (if applicable), Certificates of Insurance, Special Provisions For Disadvantaged and Women Business Enterprise Utilization (if bound herein), and West Virginia Department of Labor Wage Rates.

§1.1.2 THE CONTRACT

§1.1.2 Make the following changes to Section 1.1.2:

In the last sentence, insert "and the Contractor" after "The Architect" and delete "the Architect's" and insert "their respective".

ARTICLE 2
OWNER

§2.1 GENERAL

§2.1.2 Delete Section 2.1.2 in its entirety.

§2.1 Add the following Section to 2.1:

§2.1.3 The Owner reserves the right to maintain a full time project representative at the site who shall have such duties and responsibilities as the Owner may assign. The Owner's representative shall not interfere with or be responsible for the Contractor's means, methods, techniques, sequences and procedures for accomplishing the Work.

§2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§2.2.3 Delete the last sentence of Section 2.2.3 and substitute the following:

The Contractor shall confirm the locations of each utility. If the Owner has provided geotechnical and other tests to determine subsurface conditions, the Owner will provide such documents to the Contractor; the Contractor acknowledges that it will make no claims for any subsurface or any other conditions revealed by these tests.

§2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

§2.4 Delete the third sentence of Section 2.4.

ARTICLE 3
CONTRACTOR

§3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§3.2.2 Add the following sentence to the end of Section 3.2.2:

Claims by Contractor resulting from its failure to familiarize itself with the site or pertinent documents shall be deemed waived.

§3.2.3 Delete Section 3.2.3 in its entirety and substitute the following:

§3.2.3 The Contractor acknowledges its continuing duty to review and evaluate the Construction Documents during performance of its services and shall immediately notify the Owner and the Architect about any problems, conflicts, defects, deficiencies, inconsistencies or omissions it discovers in or between the Construction Documents; and variances it discovers between the Construction

Documents and applicable laws, statutes, building codes, rules and regulations.

§ 3.2.4 Add the following clauses to Section 3.2.4:

§3.2.4.1 If the Contractor performs any Work which it knows or should have known involves a recognized problem, conflict, defect, deficiency, inconsistency or omission in the Construction Documents; or a variance between the Construction Documents and requirements of applicable laws, statutes, building codes, rules and regulations, without notifying the Owner and the Architect prior to receiving written authorization from the Architect to proceed, the Contractor shall be responsible for the consequences of such performance.

§3.2.4.2 Before ordering any materials or doing any Work, the Contractor and Subcontractors shall verify all measurements at the site and shall be responsible for the correctness of same. Discrepancies shall be reported in writing to the Architect prior to proceeding with the Work. No extra charge or compensation will be entertained due to differences between actual measurements and dimensions indicated on the drawings, if such differences do not result in a change in the scope of Work or if the Architect failed to receive written notice before the Work was performed.

§3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§3.3.1 Make the following changes to Section 3.3.1:

In the last sentence, delete the word "solely" the first time it appears and insert at the end of this sentence "unless the Contractor is grossly negligent."

§3.4 LABOR AND MATERIALS

§3.4.1 Add the following clauses to Section 3.4.1:

§3.4.1.1 In accordance with West Virginia Code §5-19-1 *et seq.*, every contract and subcontract for the construction, reconstruction, alteration, repair, improvement or maintenance of public works, where the cost is more than $50,000 and, in the case of steel only, where the cost of steel is more than $50,000 or where more than 10,000 pounds of steel are required, the State will accept only aluminum, glass or steel products produced in the United States. In addition, items of machinery or equipment purchased for use at the site of public works, shall be made of domestic aluminum, glass or steel, unless the cost of the product is less than $50,000 or less than 10,000 pounds of steel are used in the public works project.

§3.4.1.2 Foreign made aluminum, glass or steel products may be accepted only if the cost of domestic products is found to be unreasonable. Such cost is unreasonable if it is twenty percent (20%) or more higher than the bid price for foreign made products. If the domestic aluminum, glass or steel products to be supplied or produced are in a "substantial labor surplus area," as defined by the United States Department of Labor, foreign made products may be supplied only if domestic products are thirty percent (30%) or more higher in price than the foreign made products.

§3.4.1.3 If, prior to the award of a contract under the above provisions, the spending officer of the spending unit determines that there exists a bid for like foreign aluminum, glass or steel that is reasonable and lower than the lowest bid for domestic products, the spending officer may request in writing a reevaluation and reduction in the lowest bid for such domestic products. All vendors must indicate in their bid if they are supplying foreign aluminum, glass or steel.

§3.4.1.4 PREFERENCE FOR USE OF DOMESTIC STEEL PRODUCTS

.1 Except when authorized by the director of the Purchasing Division pursuant to Subclause .2 below, no contractor may use or supply steel products for a state contract project other than those steel products made in the United States. As used in this contract:

a. "State contract project" means any erection or construction of, or any addition to, alteration of or other improvement to any building or structure, including, but not limited to, roads or highways, or the installation of any heating or cooling or ventilating plants or other equipment, or the supply of any materials for such projects, pursuant to a contract with the State of West Virginia for which bids were solicited on or after June 6, 2001.

b. "Steel products" means products rolled, formed, shaped, drawn, extruded, forged, cast, fabricated or otherwise similarly processed, or processed by a combination of two or more of such operations, from steel made by the open hearth, basic oxygen, electric furnace, bessemer or other steel making process.

c. "United States" means the United States of America and includes all territory, continental or insular, subject to the jurisdiction of the United States.

.2 The director of the Purchasing Division may, in writing, authorize the use of foreign steel products if:

a. The cost for each contract item used does not exceed one tenth of one percent (.1 %) of the total contract cost or two thousand five hundred dollars ($2,500.00), whichever is greater. For the purposes of this contract, the cost is the value of the steel product as delivered to the project; or

b. The director of the Purchasing Division determines that specified steel materials are not produced in the United States in sufficient quantity or otherwise are not reasonably available to meet contract requirements.

.3 A contractor who uses steel products in violation of this Clause may be subject to civil penalties pursuant to West Virginia Code §5A-3-56.

§3.4.1.5 The Contractor and all Subcontractors shall pay the higher of the U. S. Department of Labor minimum wage rates or the West Virginia Department of Labor minimum wage rates for the County in which this contract is performed, pursuant to West Virginia Code §21-5A-1 *et seq.*

§3.4.1.6 WEST VIRGINIA JOBS ACT: Pursuant to West Virginia Code §21-1C-1 *et seq.*, every public improvement contract or subcontract let by a public authority shall contain the following language:

.1 DEFINITIONS:

a. The term "construction project" means any construction, reconstruction, improvement, enlargement, painting, decorating or repair of any public improvement let to contract in an amount equal to or greater than one million dollars ($1,000,000). The term "construction project" does not include temporary or emergency repairs;

b. (1) The term "employee" means any person hired or permitted to perform hourly work for wages by a person, firm or corporation in the construction industry;

(2) The term "employee" does not include:

(A) Bona fide employees of a public authority or individuals engaged in making temporary or emergency repairs;

(B) Bona fide independent contractors; or

(C) Salaried supervisory personnel necessary to assure efficient execution of the employee's work;

c. The term "employer" means any person, firm or corporation employing one or more employees on any public improvement and includes all contractors and subcontractors;

d. The term "local labor market" means every county in West Virginia and all counties bordering West Virginia that fall within seventy-five (75) miles of the border of West Virginia;

e. The term "public authority" means any officer, board, commission or agency of the State of West Virginia and its political subdivisions, including counties and municipalities. Further, the Economic Grant Committee, Economic Development Authority, Infrastructure and Jobs Development Council and School Building Authority shall be required to comply with the provisions of this Clause for loans, grants or bonds provided for public improvement construction projects; and

f. The term "public improvement" includes the construction of all buildings, roads, highways, bridges, streets, alleys, sewers, ditches, sewage disposal plants, waterworks, airports and all other structures that may be let to contract by a public authority, excluding improvements funded, in whole or in part, by federal funds.

.2 LOCAL LABOR MARKET UTILIZATION ON PUBLIC IMPROVEMENT CONSTRUCTION PROJECTS; WAIVER CERTIFICATES:

a. Employers shall hire at least seventy-five percent (75%) of employees for public improvement construction projects from the local labor market, to be rounded off, with at least two employees from outside the local labor market permissible for each employer per project.

b. Any employer unable to employ the minimum number of employees from the local labor market shall inform the nearest office of the Bureau of Employment Programs' Division of Employment Services of the number of qualified employees needed and provide a job description of the positions to be filled.

c. If, within three (3) business days following the placing of a job order, the Division is unable to refer any qualified job applicants to the employer or refers less qualified job applicants than the number requested, then the Division shall issue a waiver to the employer stating the unavailability of applicants and shall permit the employer to fill any positions covered by the waiver from outside the local labor market. The waiver shall be either oral or in writing and shall be issued within the prescribed three (3) days. A waiver certificate shall be sent to both the employer for its permanent project records and to the public authority.

.3 SCOPE; REPORTING REQUIREMENTS:

a. Pursuant to West Virginia Code §21-1C-5, the West Virginia Jobs Act applies to expenditures for construction projects by any public authority for public improvements as defined by this Act.

b. For public improvement projects let pursuant to the West Virginia Jobs Act, the public authority shall file or require an employer as defined in Chapter 21, Article 1C, Section 2 to file with the Division of Labor copies of the waiver certificates and certified payrolls, pursuant to West Virginia Code, Chapter 21, Article 5A, or other comparable documents that include the number of employees, the

county and state wherein the employees reside and their occupation.

c. The Division of Labor shall compile the information required by this section and submit it annually to the Joint Committee on Government and Finance by the fifteenth day of October. The joint committee may forward these reports to the Legislative Auditor to review and make comments regarding the usefulness of the information collected and to suggest changes to the division's method of reporting to ensure the information collected will prove useful in evaluating the effectiveness of the provisions of this Clause.

d. Each public authority has the duty to implement the reporting requirements of this Clause. Every public improvement contract or subcontract let by a public authority shall contain provisions conforming to the requirements of this Clause.

e. The Division of Labor is authorized to establish procedures for the efficient collection of data, collection of civil penalties prescribed in West Virginia Code §21-1C-6 and transmittal of data to the Joint Committee on Government and Finance.

.4 PENALTIES: Pursuant to West Virginia Code §21-1C-6, any employer who violates any provision of this Clause is subject to a civil penalty of one hundred dollars ($100) per day of violation.

§3.4.1.7 PUBLIC IMPROVEMENT CONTRACTS & DRUG-FREE WORKPLACE ACT: The Contractor must, at all times during the term of this Agreement, be in compliance with West Virginia Code §21-1D-1 *et seq.*, which provides, in part:

.1 DEFINITIONS:

a. The term "construction", as used in this article, means any construction, reconstruction, improvement, enlargement, painting, decorating or repair of any public improvement let to contract the value of which contract is over $100,000. The term "construction" does not include temporary or emergency repairs;

b. The term "contractor" means any employer working on a public improvement without regard to whether they are serving as the prime or subcontractor to another;

c. The term "employee" means a laborer, mechanic or other worker. For the purposes of this article, employee does not include those persons as are employed or hired directly by a public authority on a regular or temporary basis engaged exclusively in making temporary or emergency repairs. Furthermore, employee does not include those persons employed by a contractor who does not work in public improvement construction;

d. The term "public authority", as used in this article, means any officer, board or commission or other agency of the State of West Virginia, its counties or municipalities or any political subdivision thereof, authorized by law to enter into a contract for the construction of a public improvement, including any institution supported, in whole or in part, by public funds of the State of West Virginia and this article applies to expenditures of these institutions made, in whole or in part, from public funds; and

e. The term "public improvement", as used in this article, includes all buildings, roads, highways, bridges, streets, alleys, sewers, ditches, sewage disposal plants, waterworks, airports and all other structures upon which construction may be let to contract by the State of West Virginia, its counties or municipalities or any political subdivision thereof.

.2 No public authority may award a public improvement contract which is to be let to bid to a contractor unless the terms of the contract require the contractor and its subcontractors to implement and maintain a written drug-free workplace policy in compliance with this article and the contractor and its subcontractors provide a sworn statement in writing, under the penalties of perjury, that they maintain a valid drug-free workplace policy in compliance with this article.

The public improvement contract shall provide for the following:

(1) That the contractor implements its drug-free workplace policy;

(2) Cancellation of the contract by the awarding public authority if the contractor:

(A) Fails to implement its drug-free workplace policy;

(B) Fails to provide information regarding implementation of the contractor's drug-free workplace policy at the request of the public authority; or

(C) Provides to the public authority false information regarding the contractor's drug-free workplace policy.

.3 Each contractor that submits a bid for the work must submit at the same time an affidavit that the contractor has a written plan for a drug-free workplace policy in compliance with West Virginia Code §21-1D-5. A public improvement contract may not be awarded to a contractor who does not have a written

plan for a drug-free workplace policy and who has not submitted that plan to the appropriate contracting authority in timely fashion.

.4 In instances where a worker is required by law to follow United States Department of Transportation drug testing guidelines, no additional drug tests are required under this article.

.5 A clearly legible copy of the contractor's written drug-free workplace policy shall be kept posted in a prominent and easily accessible place at the public improvement construction site thereof by each contractor subject to the provisions of this article.

.6 Every contractor shall keep an accurate record showing the names, occupation and safety-sensitive status of all employees, in connection with the construction on the public improvement, and showing any drug tests or alcohol tests performed and employee education and supervisor training received, which record shall be open at all reasonable hours for inspection by the public authority which let the contract and its officers and agents. It is not necessary to preserve the record for a period longer than three (3) years after the termination of the contract.

.7 All drug testing information specifically related to individual employees is confidential and should be treated as such by anyone authorized to review or compile program records. Drug test results may not be used in a criminal proceeding without the employee's consent.

.8 No less than once per year, or upon completion of the project, every contractor shall provide a certified report to the public authority which let the contract. The report shall include:

(1) Information to show that the education and training service to the requirements of section five [§ 21-1D-5] of this article was provided;

(2) The name of the laboratory certified by the United States Department of Health and Human Services or its successor that performs the drug tests pursuant to this article;

(3) The average number of employees in connection with the construction on the public improvement;

(4) Drug test results for the following categories including the number of positive tests and the number of negative tests:

(A) Preemployment and new hires;

(B) Reasonable suspicion;

(C) Post-accident;

(D) Random.

.9 PENALTIES:

a. Any contractor who violates any provision of this article is, for the first offense, guilty of a misdemeanor and, upon conviction thereof, shall be fined not more than $1,000; for the second offense, the person is guilty of a misdemeanor and, upon conviction thereof, shall be fined not less than $1,000 nor more than $5,000; for the third or any subsequent offense within the preceding five years, the person is guilty of a misdemeanor and, upon conviction thereof, shall be fined not less than $5,000 nor more than $25,000 and the contractor shall be excluded from bidding any additional new public improvement projects for a period of one year.

b. Any person who directly or indirectly aids, requests or authorizes any other person to violate any of the provisions of this article is guilty of a misdemeanor and, upon conviction thereof, shall be fined not less than $50 nor more than $250.

§3.4 Add the following Sections to 3.4:

§3.4.4 Where materials and equipment are to be provided by the Owner under the Contract Documents, the Contractor shall notify the Owner in writing as to when materials and equipment are required on the project site in sufficient time to avoid delay in the Work.

§3.4.5 The Contractor shall employ labor on the Project or in connection with the Work, capable of working harmoniously with all trade crafts and any other individuals associated with the Project. The Contractor shall also use its best efforts and implement policies and practices to minimize the likelihood of any strike, work stoppage or other labor disturbance. Except as specifically provided in this Agreement, Contractor shall not be entitled to any adjustment in the Contract sum or Contract time and shall be liable to the Owner for all damages suffered by the Owner occurring as a result of work stoppages, slowdowns, disputes, or strikes by the work force of or provided by Contractor or its Subcontractors.

§3.5 WARRANTY

§3.5 Add the following sentence at the end of Section 3.5:

The Contractor agrees to assign to the Owner at time of Final Completion of the Work, any and all manufacturer's warranties relating to materials and labor used in the Work and further agrees to perform the Work in such a manner so as to preserve any and all such warranties.

§3.8 ALLOWANCES

§3.8.3 Make the following change to Section 3.8.3:

§3.8.3 Delete "with reasonable promptness" and insert "in sufficient time to avoid delay in the Work."

Add the following Section to 3.8:

§3.8.4 The Contractor shall promptly submit to the Owner an itemized account of any expenditure by the Contractor of the Contract allowance in sufficient detail to allow the Owner to properly account for such expenditure.

§3.9 SUPERINTENDENT/PROJECT MANAGER

§3.9.1 Add the following sentence to the end of Section 3.9.1:

The Contractor may also employ a competent project manager.

§3.9.2 Make the following changes to Section 3.9.2:

In the first sentence, add "and project manager, if applicable" after "superintendent." In the second sentence, add "or project manager, if applicable," after "superintendent."

§3.9.3 Make the following changes to Section 3.9.3:

In the first sentence, add "or project manager, if applicable," after "superintendent." In the second sentence, add "or project manager, if applicable," after "superintendent."

§3.9 Add the following Section to 3.9:

§3.9.4 The Owner shall have the right, at any time, to direct a change in the Contractor's representatives if their performance is deemed unsatisfactory.

§3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§3.10.1 Make the following changes to Section 3.10.1:

In the first sentence, delete the word "promptly" and substitute "by the earliest reasonable date".

Add the following sentence to the end of Section 3.10.1: "The Contractor shall submit an updated construction schedule with each payment application, unless waived by the Owner."

Add the following Sections to 3.10:

§3.10.4 At any time after the first thirty (30) days of the Contract Time, if it is found that the project is two (2) weeks or more behind schedule, beyond approved time extensions, or if at any time during the last thirty (30) days of the scheduled Contract Time the Contractor is one (1) week or more behind schedule, the Contractor shall immediately submit a plan to the Owner describing how the Work will be placed back on schedule within the remaining Contract Time.

§3.10.5 If the Owner and the Architect determine that the performance of the Work during any stage of the construction schedule last approved by the Owner has not progressed or reached the level of completion required by the Contract Documents, the Owner will have the right to order the Contractor to take corrective measures (hereinafter referred to collectively as Extraordinary Measures) necessary to expedite the progress of the Work, including, without limitation: (1) working additional shifts or overtime; (2) supplying additional manpower, equipment and facilities; and (3) other similar measures. Such Extraordinary Measures shall continue until the progress of the Work complies with the last approved construction schedule. The Owner's right to require Extraordinary Measures is solely for the purpose of ensuring the Contractor's compliance with the construction schedule after allowing for approved extensions of Contract Time as provided elsewhere in this Agreement. The Contractor is not entitled to an adjustment in the Contract Sum in connection with any Extraordinary Measures required by the Owner. The Owner may exercise its rights under this Section as frequently as the Owner deems necessary to ensure that the Contractor's performance of the Work will comply with the construction schedule.

§3.11 DOCUMENTS AND SAMPLES AT THE SITE

§3.11 Insert the following sentence at the end of Section 3.11:

The Contractor's compliance with this Section 3.11 shall be a condition precedent to any obligation of the Owner to make Final Payment pursuant to this Agreement.

§3.15 CLEANING UP

§3.15.2 Delete Section 3.15.2 in its entirety and substitute the following:

§3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and may withhold such reasonable costs as necessary for the fulfillment of the Contractor's obligation under this Section 3.15. If the reasonable costs of such cleaning exceed the Contract Sum then due the Contractor, the Contractor shall reimburse the Owner the difference within thirty (30) consecutive calendar days of the Owner's written request.

§3.15 Add the following Section to 3.15:

§3.15.3 In order to achieve Substantial Completion, as defined by Section 9.8, for any portion of the Work, the Contractor must have the area where the Work is located fully cleaned and all materials and/or debris removed from site. The Certificate of Substantial

Completion will not be issued until the Contractor has met this obligation.

ARTICLE 4
ARCHITECT

§4.1 GENERAL

§4.1.1 Make the following changes to Section 4.1.1:

In first sentence, delete the period and add ", when required pursuant to West Virginia Code §30-12-1 *et seq.*" Add the following sentence at the end of Section 4.1.1: "If the Owner does not retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located, the Owner will appoint an individual to assume the role and obligations of the Architect pursuant to this Agreement."

§4.2 ADMINISTRATION OF THE CONTRACT

§4.2 Make the following changes to Section 4.2:

§4.2.1 In the first sentence of Section 4.2.1 after the word Architect add ", unless otherwise indicated by the Owner,".

§4.2.2 In the first sentence of Section 4.2.2 strike the word "generally."

§4.2.3 In the first sentence of Section 4.2.3 strike the word "reasonably."

§4.2.5 Add the following sentence at the end of Section 4.2.5:

The Architect upon receipt of an Application for Payment from the Contractor shall either review and certify such amounts due for payment or return such Application for Payment to the Contractor for correction(s) within five (5) consecutive business days of receipt.

§4.2.7 Delete the first sentence and substitute the following:

The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples for the purpose of checking for conformance with the Contract Documents.

§4.2.8 Make the following change to Section 4.2.8:

In the first sentence, after the word Architect add ", in consultation with the Owner,".

ARTICLE 7
CHANGES IN THE WORK

§7.2 CHANGE ORDERS

§7.2 Add the following Section to 7.2:

§7.2.2 A written Change Order as defined under 7.2.1 above constitutes a final settlement of all matters relating to the change in the Work which is the subject of the Change Order, including, but not limited to general conditions, all direct or indirect costs associated with such change and any and all adjustment to the Contract Sum and Contract Time.

§7.3 CONSTRUCTION CHANGE DIRECTIVES

§7.3.7 Make the following change in Section 7.3.7:

In the fourth line of the first sentence, delete the words "an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount" and substitute "an allowance for overhead and profit in accordance with clauses 7.3.11.1 through 7.3.11.9 below."

§7.3.9 Delete Section 7.3.9 in its entirety and substitute the following:

§7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, amounts not in dispute for such changes in the Work shall be included in Applications for Payment provided these amounts have been added to the Contract by Change Order and a purchase order has been issued for the Change Order.

§7.3.10 Add the following sentence at the end of Section 7.3.10:

The Change Order shall be issued by the Owner within 60 days following such agreement.

Add the following Section to 7.3:

§7.3.11 In Section 7.3.7, the allowance for overhead and profit included in the total cost to the Owner shall be based on the following schedule:

.1 For the Contractor, for any Work performed by the Contractor's own forces, fifteen percent (15%) of the cost.

.2 For the Contractor, for Work performed by the Contractor's Subcontractor, ten percent (10%) of the amount due the Subcontractor.

.3 For each Subcontractor or Sub-Subcontractor involved, for any Work performed by that Subcontractor's own forces, fifteen percent (15%) of the cost.

.4. For each Subcontractor, for Work performed by the Subcontractor's Sub-subcontractors, ten percent (10%) of the amount due the Sub-subcontractor.

.5 Cost to which overhead and profit is to be applied shall be determined in accordance with Section 7.3.7. Estimated labor hours shall include hours only for those workmen and working foremen directly involved in performing the Change Order work. Supervision above the level of working foremen (such as general foremen, superintendent, project manager, etc.) is considered to be included in the allowance for Overhead and Profit. Hand tools are defined as equipment with a value of $1,000 or less. For Contractor owned equipment, the "bare" equipment rental rates allowed to be used for pricing Change Order proposals shall be not more than the monthly rate listed in the most current publication of The AED Green Book divided by 176 to arrive at a maximum hourly rate to be applied to the hours the equipment is used performing the Change Order work.

.6 In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, material, equipment and Subcontractors. Details to be submitted will include detailed line item estimates showing detailed materials quantity take-offs, material prices by item and related labor hour pricing information and extensions (by line item or by drawing as applicable.) Where major cost items are Subcontracts, they shall also be itemized as prescribed above. In no case will a change involving over $10,000 be approved without such an itemization.

.7 Local Business and Occupation Taxes, if applicable, shall be calculated on the cost of the Work, overhead and profit.

.8 Overhead and profit shall not be calculated on changes in the Work involving unit prices. Unit prices are to have overhead and profit included in the price quoted.

ARTICLE 8
TIME

§8.3 DELAYS AND EXTENSIONS OF TIME

§8.3.1 In the first sentence, delete "unusual delay in deliveries,".

ARTICLE 9
PAYMENTS AND COMPLETION

§9.2 SCHEDULE OF VALUES

§9.2 Make the following changes to Section 9.2:

In the first sentence add "and the Owner" after the first reference to the Architect. In the second sentence add "or the Owner" after Architect.

§9.3 APPLICATIONS FOR PAYMENT

§9.3 Make the following changes to Section 9.3:

§9.3.1 In the first sentence add "and the Owner" after the first reference to the Architect and add "and other required documents" after the words "schedule of values."

§9.3.1.1 Delete clause 9.3.1.1 in its entirety and substitute the following:

§9.3.1.1 Such applications may include requests for payment on account of changes in the Work authorized by Construction Change Directives and Change Orders only after a purchase order has been issued for the Work affected.

§9.3.1 Add the following clauses to Section 9.3.1:

§9.3.1.3 Until the Work is fifty percent (50%) complete, the Owner will withhold as retainage 10% of the amount due the Contractor on account of progress payments. At the time the Work is fifty percent (50%) complete and thereafter, if the manner of completion of the Work and its progress are and remain satisfactory to the Owner and Architect, and in the absence of other good and sufficient reasons, the Architect will, on presentation by the Contractor of Consent of Surety, authorize any remaining partial payments to be paid in full.

§9.3.1.4 The full Contract retainage may be reinstated if the manner of completion of the Work and its progress do not remain satisfactory to the Owner and Architect, if the Surety withholds its consent, or for other good and sufficient reasons.

§9.6 PROGRESS PAYMENTS

§9.6.7 Delete Section 9.6.7 in its entirety.

§9.7 FAILURE OF PAYMENT

§9.7 Make the following changes in Section 9.7:

In line two, change "seven days" to "sixty days." In line four, delete "binding dispute resolution" and substitute "a court of competent jurisdiction in the State of West Virginia."

§9.8 SUBSTANTIAL COMPLETION

§9.8.5 Add the following clause to Section 9.8.5:

§9.8.5.1 The payment of retainage shall be sufficient to increase the total payments to ninety-five percent (95%) for the Work or designated portion thereof being accepted as Substantially

Complete, less any amounts as the Architect shall determine for any Work that is not complete, not in accordance with the Contract Documents, or for unsettled claims.

§9.10 FINAL COMPLETION AND FINAL PAYMENT

§9.10.2 Make the following changes in Section 9.10.2:

In the first sentence, delete "for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner)."

Add the following clause to Section 9.10.2:

§9.10.2.1 Before final payment is due the Contractor, all applicable State and local taxes must be paid. If requested by the Owner, the Contractor shall present evidence that payment or satisfaction of all such tax obligations has been made.

§9.10.3 Add the following clause to Section 9.10.3:

9.10.3.1 Unless and to the extent final completion is delayed through no fault of the Contractor as provided in Section 9.10.3, the Owner shall be under no obligation to increase payments above ninety-five percent (95%) until final completion of the Work is Certified by the Architect.

Add the following Sections to Article 9:

§9.11 LIQUIDATED DAMAGES

§9.11.1 The Owner will suffer financial loss if the Work is not Substantially Complete within the Contract Time as defined in Article 8, and if final completion is not achieved within the specified time frame following Substantial Completion. As liquidated damages, and not as a penalty, the Contractor and the Contractor's surety shall be liable for and shall pay the Owner the sum(s) stated in this Agreement and/or purchase order.

§9.11.2 Allowances may be made for delays due to shortages of materials and/or energy resources, subject to proof by documentation, and also for delays due to strikes or other delays beyond the control of the Contractor. All delays and any claim for extension of Contract Time must be properly documented in accordance with Section 15.1.5 by the Contractor and must be made within the time limits stated in Section 15.1.2.

ARTICLE 10
PROTECTION OF PERSONS AND PROPERTY

§10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

§10.2.8 Make the following changes to Section 10.2.8:

In the first sentence, delete "within a reasonable time not exceeding 21 days" and substitute "immediately".

§10.3 HAZARDOUS MATERIALS

§10.3.3 Delete Section 10.3.3 in its entirety.

§10.3.6 Make the following change to Section 10.3.6:

Delete "indemnify" and substitute "reimburse."

ARTICLE 11
INSURANCE AND BONDS

§11.1 CONTRACTOR'S LIABILITY INSURANCE

§11.1.1 Make the following changes in Section 11.1.1:

§11.1.1.1 Delete the semicolon at the end of clause 11.1.1.1 and add:

", including private entities performing Work at the site and exempt from the coverage on account of number of employees or occupation, which entities shall maintain voluntary compensation coverage at the same limits specified for mandatory coverage for the duration of the Project."

§11.1.1.2 Delete the semicolon at the end of clause 11.1.1.2 and add:

"as described in West Virginia Code §23-4-2 (Mandolidis), or persons or entities excluded by statute from the requirements of clause 11.1.1.1 but required by the Contract Documents to provide the insurance required by that clause."

§11.1.2 Add the following clause to Section 11.1.2:

§11.1.2.1 The insurance coverages required by Section 11.1.1 shall be written for not less than the minimum limits (or greater if required by law) set forth in the sample Certificate of Insurance following these Supplementary Conditions.

§11.1.4 Delete Section 11.1.4 in its entirety and substitute the following:

§11.1.4 The Owner shall require the Contractor to purchase and maintain liability insurance coverage, primary to the Owner's coverage under Paragraph 11.2. Owner, Architect, and Architect's Consultants shall be named as additional insureds on Contractor's Commercial General Liability Insurance specified for operations and completed operations, but only with respect for bodily injury, property damage or personal and advertising injury to the extent caused by the negligent acts or omissions of the Contractor, or those acting on the Contractor's behalf, in the performance of the Contractor's Work for the Owner at the Worksite.

§11.3 PROPERTY INSURANCE

§11.3.1 Make the following changes to Section 11.3.1:

At the beginning of the first sentence, delete "Unless otherwise provided, the Owner" and substitute "The Contractor".

Add the following sentences at the end of this Section:

The form of policy for this coverage shall be Completed Value. If the Owner is damaged by the failure of the Contractor to maintain such insurance, then the Contractor shall bear all reasonable costs properly attributable thereto.

§11.3.1.2 Delete clause 11.3.1.2 in its entirety.

§11.3.1.3 Delete clause 11.3.1.3 in its entirety.

§11.3.2 BOILER AND MACHINERY INSURANCE

§11.3.2 Make the following changes to Section 11.3.2:

In the first line, delete "Owner" and substitute "Contractor".

§11.3.4 Delete Section 11.3.4 in its entirety.

§11.3.6 Make the following changes in Section 11.3.6:

At the beginning of the first sentence, delete "Before an exposure to loss may occur, the Owner shall file with the Contractor" and substitute "Before an exposure to loss may occur, the Contractor shall file with the Owner".

At the end of the third sentence, delete "Contractor" and substitute "Owner."

§11.3.7 WAIVERS OF SUBROGATION

§11.3.7 Make the following change in Section 11.3.7:

At the end of the first sentence, delete "Owner" and substitute "Contractor".

§11.3.8 Make the following changes in Section 11.3.8:

In the first sentence, substitute "Contractor" for "Owner" each time the latter word appears.

§11.3.9 Make the following changes in Section 11.3.9:

Substitute "Contractor" for "Owner" each time the latter word appears, except in the last sentence. In the second sentence, delete "method of binding dispute resolution selected in the Agreement between the Owner and Contractor" and substitute "court award or judgment."

§11.3.10 Delete Section 11.3.10 in its entirety and substitute the following:

§11.3.10 The Contractor as fiduciary shall have the power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Contractor's exercise of this power, if such objection is made, the dispute shall be resolved as provided in Section 4.5. The Contractor as fiduciary shall, in that case, make settlement with insurers in accordance with directions of the Court. If distribution of the insurance proceeds as directed by the Court is required, the Court will direct such distribution.

§11.4 PERFORMANCE BOND AND PAYMENT BOND

§11.4.1 Add the following clauses to Section 11.4.1:

§11.4.1.1 The Contractor shall provide, at the Contractor's expense, a Performance Bond and a Labor and Material Payment Bond for 100% of the Contract Sum and, if applicable, a two-year roofing Maintenance Bond for the full value of the roofing system. The surety company must be one with which the Owner has no reasonable objection and it must be authorized to transact surety insurance business in the State of West Virginia.

§11.4.1.2 An attorney-in-fact who executes the bonds on behalf of the surety shall affix thereto a certified and current copy of power of attorney.

§11.4.1.3 The bonds shall be issued on State of West Virginia forms. The Contractor shall deliver the required bonds and all other contract documents to the Owner not later than 15 days following receipt of the Owner's notice of intent to award a Contract.

Add the following Section to Article 11:

§11.5 WAGE BOND

The Contractor, if engaged in construction work in West Virginia less than five consecutive years preceding the date of the Bid, shall post a wage bond with the West Virginia Department of Labor.

ARTICLE 13
MISCELLANEOUS PROVISIONS

§13.6 INTEREST

§13.6 Delete Section 13.6 in its entirety and substitute the following:

Notwithstanding any other provision in the Contract Documents, any interest due and payable for payments due and unpaid under the Contract Documents shall be made pursuant to West Virginia Code.

§13.7 TIME LIMITS ON CLAIMS

§13.7 Delete Section 13.7 in its entirety and substitute the following:

Any applicable statute of limitations shall be in accordance with West Virginia Code.

Add the following Sections to Article 13:

§13.8 WORKERS COMPENSATION

The Contractor shall provide proof of compliance with West Virginia Worker's Compensation laws and regulations.

§13.9 CONTRACTOR'S LICENSE

§11.7.1 West Virginia Code §21-11-2 requires that all persons desiring to perform contractual work in West Virginia shall be duly licensed. The West Virginia Contractor's Licensing Board is empowered to issue a contractor's license.

§11.7.2 West Virginia Code §21-11-11 requires any prospective Bidder to include the Bidder's contractor's license number on its Bid. The successful Bidder will be required to furnish a copy of its contractor's license in a classification appropriate to the Work prior to issuance of a purchase order/contract.

ARTICLE 14
TERMINATION OR SUSPENSION OF THE CONTRACT

§14.1 TERMINATION BY THE CONTRACTOR

§14.1.1 Make the following changes in Section 14.1.1:

At the end of clause 14.1.1.3 delete "; or" and insert a period.

Delete clause 14.1.1.4 in its entirety.

§14.1.3 Delete Section 14.1.3 in its entirety and substitute the following:

§14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exist, the Contractor may, upon seven days written notice to the Owner and Architect, terminate the Contract. In such event, the Contractor shall be paid for all Work performed in accordance with the Contract Documents, for reasonable and proven termination expenses and a reasonable allowance for overhead and profit. However, such payment, exclusive of termination expenses, shall not exceed the Contract Sum as reduced by other payments made to the Contractor and further reduced by the value of Work as yet not completed. The Contractor shall be entitled to reasonable overhead, but not profit, on Work not performed.

§14.2 TERMINATION BY THE OWNER FOR CAUSE

§14.2.4 Delete Section 14.2.4 in its entirety and substitute the following:

§14.2.4 If the unpaid balance of the Contract Sum exceeds the cost of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall not be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Owner shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§14.4.1 Delete Section 14.4.1 in its entirety and substitute the following:

§14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause upon thirty days written notice.

§14.4.3 Delete Section 14.4.3 in its entirety and substitute the following:

§14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment from the Owner on the same basis provided in Section 14.1.3 above.

Add the following Section to Article 14:

§14.5 FISCAL YEAR FUNDING

§14.5 Work performed under this Contract is to continue in the succeeding fiscal year contingent upon funds being appropriated by the Legislature for this Work. In the event funds are not appropriated for this Work, this Contract becomes of no effect and is null and void after June 30.

ARTICLE 15
CLAIMS AND DISPUTES

§15.2 INITIAL DECISION

§15.2.1 In the third sentence of Section 15.2.1 , insert "or litigation" following the word "mediation".

§15.2.5 Delete the last sentence in Section 15.2.5 and substitute the following:

Approval or rejection of a claim by the Initial Decision Maker shall be final and binding on the parties unless it is pursued further by either party in accordance with Section 15.2.6.

§15.2.6 Make the following change to clause 15.2.6.1:

In the last sentence, delete "or pursue binding dispute resolution proceedings."

§15.2.8 Delete Section 15.2.8 in its entirety.

§15.3 MEDIATION

§15.3.1 Delete "binding dispute resolution" and substitute "litigation in a court of competent jurisdiction."

§15.3.2 Delete Section 15.3.2 in its entirety and substitute the following:

§15.3.2 The parties shall endeavor to resolve their Claims by non-binding mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement.

§15.4 ARBITRATION

§15.4 Delete Section 15.4 in its entirety and substitute the following:

§15.4 SETTLEMENT OF CLAIMS

§15.4.1 The Constitution of West Virginia grants the State sovereign immunity from any and all Claims against the public treasury. This immunity applies and is extended to all agencies of the State, including the Owner. It shall be in full force and effect as it relates to this Contract. The West Virginia Legislature, recognizing that certain Claims against the State may constitute a moral obligation of the State and should be heard, has established the West Virginia Court of Claims for this purpose. Notwithstanding any provision to the contrary in the Contract Documents, all references to arbitration are hereby deleted and all Claims of the Contractor for monetary relief, and only of the Contractor, arising out of or related to this Contract shall be decided by the West Virginia Court of Claims. The following Sections have been rewritten to bring them into conformance with the foregoing.

§15.4.2 Claims by the Owner may be brought against the Contractor in the Circuit Court of Kanawha County, West Virginia, or in any other court that has jurisdiction, as the Owner may elect.

§15.4.3 Any Claim arising out of or related to the Contract, except Claims relating to aesthetic effect and except those waived as provided for in Sections 15.1.6, 9.10.4 and 9.10.5, shall, within 30 days after submission of the decision by the Initial Decision Maker, be settled for the Contractor by the West Virginia Court of Claims or, for the Owner, by the Circuit Court of Kanawha County or any other court of jurisdiction as the Owner may elect.

§15.4.4 Notice of such action shall be filed in writing with the other party to the Contract, and a copy of such notice shall be filed with the Initial Decision Maker and the Architect, if applicable.

§15.4.5 During court proceedings, the Owner and the Contractor shall comply with Section 15.1.3.

§15.4.6 Claims shall be made within the time limits specified in Section 15.2.6.1.

§15.4.7 The party filing a Claim must assert in the demand all Claims then known to that party on which action is permitted.

Add the following Article:

ARTICLE 16
EQUAL OPPORTUNITY

§16.1 COMPLIANCE WITH REGULATIONS UNDER TITLE VI OF THE FEDERAL CIVIL RIGHTS ACT OF 1964 AND EXECUTIVE ORDER 65-2 BY THE GOVERNOR OF WEST VIRGINIA DATED DECEMBER 15, 1965

§16.1.1 The Contractor agrees that it will comply with Title VI of the Federal Civil Rights Act of 1964 (P.L. 88352) and the regulations of the State of West Virginia, to the end that no person in the State, or in the United States, shall on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or otherwise subjected to discrimination under any program or activity for which the Contractor receives any recompense or other consideration of value, either directly or indirectly from the State; and HEREBY GIVES ASSURANCE THAT it will immediately take any measures necessary to effectuate this Agreement.

§16.1.2 If any real property or structure thereon is provided or improved, this assurance shall obligate the Contractor, or in the case of any transfer of such property, any transferee, for the period during which the real property or structure is used for a purpose for which any State payment is extended or for another purpose involving the provision of similar services or benefits. If any other goods or services are so provided, this assurance shall obligate the Contractor for the period during which it supplies such goods or services.

§16.1.3 The Contractor recognizes and agrees that such right to provide property, goods or services to the State will be extended in reliance on the representations and agreements made in assurance, and that the State shall have the right to seek judicial enforcement of this assurance. This is binding on the Contractor, its successors, transferee, and assignee, or any authorized person on behalf of the Contractor.

END OF SUPPLEMENTARY CONDITIONS TO AIA DOCUMENT A201-2007

Any provisions of the Contract Documents that conflict with these Supplementary Conditions shall be null and void unless they have been approved in writing by the applicable State purchasing officer and the Attorney General, and are clearly identified as such in the bid documents.

The Owner and Contractor hereby agree to the full performance of the covenants contained herein.

IN WITNESS WHEREOF, the Owner and Contractor have entered into this Agreement as of the effective date as stated in the A101-2007 Agreement.

Owner:		Contractor:	
By:	_____	By:	_____
Title:	_____	Title:	_____
Date:	_____	Date:	_____

APPROVED AS TO FORM THIS 25th DAY OF March, 2010

DARRELL V. McGRAW, JR., ATTORNEY GENERAL

BY: Dawn E. Warfield
DEPUTY ATTORNEY GENERAL

ACORD® CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

PRODUCER	THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.	
INSURANCE AGENCY'S NAME AND ADDRESS	INSURERS AFFORDING COVERAGE	NAIC #
INSURED	INSURER A: INSURER'S NAME	
	INSURER B: INSURER'S NAME	
CONTRACTOR'S NAME AND ADDRESS	INSURER C: INSURER'S NAME	
	INSURER D:	
	INSURER E:	

COVERAGES

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	ADD'L INSRD	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YYYY)	POLICY EXPIRATION DATE (MM/DD/YYYY)	LIMITS	
A		GENERAL LIABILITY [X] COMMERCIAL GENERAL LIABILITY [ ] CLAIMS MADE [X] OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: [ ] POLICY [X] PRO-JECT [ ] LOC				EACH OCCURRENCE	$ 1,000,000
						DAMAGE TO RENTED PREMISES (Ea occurence)	$ 50,000
						MED EXP (Any one person)	$ 5,000
						PERSONAL & ADV INJURY	$ 1,000,000
						GENERAL AGGREGATE	$ 2,000,000
						PRODUCTS - COMP/OP AGG	$ 2,000,000
A		AUTOMOBILE LIABILITY [X] ANY AUTO [ ] ALL OWNED AUTOS [ ] SCHEDULED AUTOS [X] HIRED AUTOS [X] NON-OWNED AUTOS				COMBINED SINGLE LIMIT (Ea accident)	$ 1,000,000
						BODILY INJURY (Per person)	$
						BODILY INJURY (Per accident)	$
						PROPERTY DAMAGE (Per accident)	$
		GARAGE LIABILITY [ ] ANY AUTO				AUTO ONLY - EA ACCIDENT	$
						OTHER THAN AUTO ONLY: EA ACC	$
						AGG	$
B		EXCESS / UMBRELLA LIABILITY [X] OCCUR [ ] CLAIMS MADE [ ] DEDUCTIBLE [ ] RETENTION $				EACH OCCURRENCE	$ 5,000,000
						AGGREGATE	$ 5,000,000
							$
							$
							$
C		WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory In NH) Y/N [ ] If yes, describe under SPECIAL PROVISIONS below				[X] WC STATU-TORY LIMITS [ ] OTH-ER	
						E.L. EACH ACCIDENT	$ 500,000
						E.L. DISEASE - EA EMPLOYEE	$ 500,000
						E.L. DISEASE - POLICY LIMIT	$ 500,000
		OTHER					

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES / EXCLUSIONS ADDED BY ENDORSEMENT / SPECIAL PROVISIONS

Employers liability includes coverage for W. Va. Code §23-4-2 (Mandolidis). Owner, Architect and Architect's Consultants are to be named as additional insureds. (Insert project's name and address)

CERTIFICATE HOLDER	CANCELLATION
STATE AGENCY'S NAME AND ADDRESS	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING INSURER WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO DO SO SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER, ITS AGENTS OR REPRESENTATIVES.
	AUTHORIZED REPRESENTATIVE

ACORD TM CERTIFICATE OF PROPERTY INSURANCE

DATE

PRODUCER	THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.
INSURANCE AGENCY'S NAME AND ADDRESS	**COMPANIES AFFORDING COVERAGE**
	COMPANY A INSURER'S NAME
INSURED	COMPANY B
CONTRACTOR'S NAME AND ADDRESS	COMPANY C
	COMPANY D

COVERAGES

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED, NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

CO LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	COVERED PROPERTY	LIMITS
	[ ] PROPERTY				[ ] BUILDING	$
	CAUSES OF LOSS				[ ] PERSONAL PROPERTY	$
	[ ] BASIC				[ ] BUSINESS INCOME	$
	[ ] BROAD				[ ] EXTRA EXPENSE	$
	[ ] SPECIAL				[ ] BLANKET BUILDING	$
	[ ] EARTHQUAKE				[ ] BLANKET PERS PROP	$
	[ ] FLOOD				[ ] BLANKET BLDG & PP	$
						$
						$
	[X] INLAND MARINE				[X] BUILDING	$ CONTRACT AMT.
	TYPE OF POLICY				[X] TRANSIT	$ 20%
A	Inst/Builder's Risk	(if applicable)			[X] OFF-SITE	$ 20%
	CAUSES OF LOSS				[ ] STORAGE	$
	[ ] NAMED PERILS					$
	[ ] OTHER					$
	[ ] CRIME					$
	TYPE OF POLICY					$
						$
	[ ] BOILER & MACHINERY					$
						$
	[ ] OTHER					

LOCATION OF PREMISES/DESCRIPTION OF PROPERTY

PROJECT NAME AND ADDRESS

SPECIAL CONDITIONS/OTHER COVERAGES

Owner is to be named as additional insured.

CERTIFICATE HOLDER

STATE AGENCY'S NAME AND ADDRESS

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING COMPANY WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO MAIL SUCH NOTICE SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE COMPANY, ITS AGENTS OR REPRESENTATIVES.

AUTHORIZED REPRESENTATIVE

DRAFT

AIA® Document A701™ – 1997

Instructions to Bidders

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

DRAFT

AIA® Document A701™ – 1997

Instructions to Bidders

for the following PROJECT:
(Name and location or address):
Enhancements for:
West Virginia State Museum
Cultural Center
1900 Kanawha Boulevard, East
Charleston, WV 25305-0300

THE OWNER:
(Name and address):
West Virginia Division of Culture and History
1900 Kanawha Boulevard East
Charleston, WV 25305-0300

THE ARCHITECT:
(Name and address):
RSL Commercial Architecture, Inc.
8927 Rossash Rd.
Cincinnati, OH 45236

TABLE OF ARTICLES

1 DEFINITIONS

2 BIDDER'S REPRESENTATIONS

3 BIDDING DOCUMENTS

4 BIDDING PROCEDURES

5 CONSIDERATION OF BIDS

6 POST-BID INFORMATION

7 PERFORMANCE BOND AND PAYMENT BOND

8 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

Deleted: WVDCH Education Center

Deleted: of Culture and History¶

Deleted: Education Center

ADDITIONS AND DELETIONS:
The author of this documen has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the proposed Contract Documents. The Bidding Requirements consist of the Advertisement or Invitation to Bid, Instructions to Bidders, Supplementary Instructions to Bidders, the bid form, and other sample bidding and contract forms. The proposed Contract Documents consist of the form of Agreement between the Owner and Contractor, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications and all Addenda issued prior to execution of the Contract.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201, or in other Contract Documents are applicable to the Bidding Documents.

§ 1.3 Addenda are written or graphic instruments issued by the Architect prior to the execution of the Contract which modify or interpret the Bidding Documents by additions, deletions, clarifications or corrections.

§ 1.4 A Bid is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

§ 1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents as the base, to which Work may be added or from which Work may be deleted for sums stated in Alternate Bids.

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from the amount of the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

§ 1.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment or services or a portion of the Work as described in the Bidding Documents.

§ 1.8 A Bidder is a person or entity who submits a Bid and who meets the requirements set forth in the Bidding Documents.

§ 1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment or labor for a portion of the Work.

ARTICLE 2 BIDDER'S REPRESENTATIONS

§ 2.1 The Bidder by making a Bid represents that:

§ 2.1.1 The Bidder has read and understands the Bidding Documents or Contract Documents, to the extent that such documentation relates to the Work for which the Bid is submitted, and for other portions of the Project, if any, being bid concurrently or presently under construction.

§ 2.1.2 The Bid is made in compliance with the Bidding Documents.

§ 2.1.3 The Bidder has visited the site, become familiar with local conditions under which the Work is to be performed and has correlated the Bidder's personal observations with the requirements of the proposed Contract Documents.

§ 2.1.4 The Bid is based upon the materials, equipment and systems required by the Bidding Documents without exception.

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 COPIES

§ 3.1.1 Bidders may obtain complete sets of the Bidding Documents from the issuing office designated in the Advertisement or Invitation to Bid in the number and for the deposit sum, if any, stated therein. The deposit will be refunded to Bidders who submit a bona fide Bid and return the Bidding Documents in good condition within ten days after receipt of Bids. The cost of replacement of missing or damaged documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the Bidding Documents and the Bidder's deposit will be refunded.

§ 3.1.2 Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the Advertisement or Invitation to Bid, or in supplementary instructions to bidders.

§ 3.1.3 Bidders shall use complete sets of Bidding Documents in preparing Bids; neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

§ 3.1.4 The Owner and Architect may make copies of the Bidding Documents available on the above terms for the purpose of obtaining Bids on the Work. No license or grant of use is conferred by issuance of copies of the Bidding Documents.

§ 3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

§ 3.2.1 The Bidder shall carefully study and compare the Bidding Documents with each other, and with other work being bid concurrently or presently under construction to the extent that it relates to the Work for which the Bid is submitted, shall examine the site and local conditions, and shall at once report to the Architect errors, inconsistencies or ambiguities discovered.

§ 3.2.2 Bidders and Sub-bidders requiring clarification or interpretation of the Bidding Documents shall make a written request which shall reach the Architect at least seven days prior to the date for receipt of Bids.

§ 3.2.3 Interpretations, corrections and changes of the Bidding Documents will be made by Addendum. Interpretations, corrections and changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon them.

§ 3.3 SUBSTITUTIONS

§ 3.3.1 The materials, products and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution.

§ 3.3.2 No substitution will be considered prior to receipt of Bids unless written request for approval has been received by the Architect at least ten days prior to the date for receipt of Bids. Such requests shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for an evaluation. A statement setting forth changes in other materials, equipment or other portions of the Work, including changes in the work of other contracts that incorporation of the proposed substitution would require, shall be included. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

§ 3.3.3 If the Architect approves a proposed substitution prior to receipt of Bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.

§ 3.3.4 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

§ 3.4 ADDENDA

§ 3.4.1 Addenda will be transmitted to all who are known by the issuing office to have received a complete set of Bidding Documents.

§ 3.4.2 Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.

§ 3.4.3 Addenda will be issued no later than four days prior to the date for receipt of Bids except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

§ 3.4.4 Each Bidder shall ascertain prior to submitting a Bid that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 PREPARATION OF BIDS

§ 4.1.1 Bids shall be submitted on the forms included with the Bidding Documents.

§ 4.1.2 All blanks on the bid form shall be legibly executed in a non-erasable medium.

§ 4.1.3 Sums shall be expressed in both words and figures. In case of discrepancy, the amount written in words shall govern.

§ 4.1.4 Interlineations, alterations and erasures must be initialed by the signer of the Bid.

§ 4.1.5 All requested Alternates shall be bid. If no change in the Base Bid is required, enter "No Change."

§ 4.1.6 Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the bid security, state the Bidder's refusal to accept award of less than the combination of Bids stipulated by the Bidder. The Bidder shall make no additional stipulations on the bid form nor qualify the Bid in any other manner.

§ 4.1.7 Each copy of the Bid shall state the legal name of the Bidder and the nature of legal form of the Bidder. The Bidder shall provide evidence of legal authority to perform within the jurisdiction of the Work. Each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further give the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached certifying the agent's authority to bind the Bidder.

§ 4.2 BID SECURITY

§ 4.2.1 Each Bid shall be accompanied by a bid security in the form and amount required if so stipulated in the Instructions to Bidders. The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and will, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty. The amount of the bid security shall not be forfeited to the Owner in the event the Owner fails to comply with Section 6.2.

§ 4.2.2 If a surety bond is required, it shall be written on AIA Document A310, Bid Bond, unless otherwise provided in the Bidding Documents, and the attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of the power of attorney.

§ 4.2.3 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until either (a) the Contract has been executed and bonds, if required, have been furnished, or (b) the specified time has elapsed so that Bids may be withdrawn or (c) all Bids have been rejected.

§ 4.3 SUBMISSION OF BIDS

§ 4.3.1 All copies of the Bid, the bid security, if any, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and shall be identified with the Project name, the Bidder's name and address and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

§ 4.3.2 Bids shall be deposited at the designated location prior to the time and date for receipt of Bids. Bids received after the time and date for receipt of Bids will be returned unopened.

§ 4.3.3 The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

§ 4.3.4 Oral, telephonic, telegraphic, facsimile or other electronically transmitted bids will not be considered.

§ 4.4 MODIFICATION OR WITHDRAWAL OF BID

§ 4.4.1 A Bid may not be modified, withdrawn or canceled by the Bidder during the stipulated time period following the time and date designated for the receipt of Bids, and each Bidder so agrees in submitting a Bid.

§ 4.4.2 Prior to the time and date designated for receipt of Bids, a Bid submitted may be modified or withdrawn by notice to the party receiving Bids at the place designated for receipt of Bids. Such notice shall be in writing over the signature of the Bidder. Written confirmation over the signature of the Bidder shall be received, and date- and time-stamped by the receiving party on or before the date and time set for receipt of Bids. A change shall be so worded as not to reveal the amount of the original Bid.

§ 4.4.3 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids provided that they are then fully in conformance with these Instructions to Bidders.

§ 4.4.4 Bid security, if required, shall be in an amount sufficient for the Bid as resubmitted.

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 OPENING OF BIDS

At the discretion of the Owner, if stipulated in the Advertisement or Invitation to Bid, the properly identified Bids received on time will be publicly opened and will be read aloud. An abstract of the Bids may be made available to Bidders.

§ 5.2 REJECTION OF BIDS

The Owner shall have the right to reject any or all Bids. A Bid not accompanied by a required bid security or by other data required by the Bidding Documents, or a Bid which is in any way incomplete or irregular is subject to rejection.

§ 5.3 ACCEPTANCE OF BID (AWARD)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest qualified Bidder provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available. The Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's own best interests.

§ 5.3.2 The Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the low Bidder on the basis of the sum of the Base Bid and Alternates accepted.

ARTICLE 6 POST-BID INFORMATION

§ 6.1 CONTRACTOR'S QUALIFICATION STATEMENT

Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request, a properly executed AIA Document A305, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted as a prerequisite to the issuance of Bidding Documents.

§ 6.2 OWNER'S FINANCIAL CAPABILITY

The Owner shall, at the request of the Bidder to whom award of a Contract is under consideration and no later than seven days prior to the expiration of the time for withdrawal of Bids, furnish to the Bidder reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. Unless such reasonable evidence is furnished, the Bidder will not be required to execute the Agreement between the Owner and Contractor.

§ 6.3 SUBMITTALS

§ 6.3.1 The Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, after notification of selection for the award of a Contract, furnish to the Owner through the Architect in writing:

- **.1** a designation of the Work to be performed with the Bidder's own forces;
- **.2** names of the manufacturers, products, and the suppliers of principal items or systems of materials and equipment proposed for the Work; and
- **.3** names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

§ 6.3.2 The Bidder will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents.

§ 6.3.3 Prior to the execution of the Contract, the Architect will notify the Bidder in writing if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, (1) withdraw the Bid or (2) submit an acceptable substitute person or entity with an adjustment in the Base Bid or Alternate Bid to cover the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

§ 6.3.4 Persons and entities proposed by the Bidder and to whom the Owner and Architect have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and Architect.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 BOND REQUIREMENTS

§ 7.1.1 If stipulated in the Bidding Documents, the Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Bonds may be secured through the Bidder's usual sources.

§ 7.1.2 If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid. If the furnishing of such bonds is required after receipt of bids and before execution of the Contract, the cost of such bonds shall be added to the Bid in determining the Contract Sum.

§ 7.1.3 If the Owner requires that bonds be secured from other than the Bidder's usual sources, changes in cost will be adjusted as provided in the Contract Documents.

§ 7.2 TIME OF DELIVERY AND FORM OF BONDS

§ 7.2.1 The Bidder shall deliver the required bonds to the Owner not later than three days following the date of execution of the Contract. If the Work is to be commenced prior thereto in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Section 7.2.1.

§ 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond. Both bonds shall be written in the amount of the Contract Sum.

§ 7.2.3 The bonds shall be dated on or after the date of the Contract.

§ 7.2.4 The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney.

ARTICLE 8 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

Unless otherwise required in the Bidding Documents, the Agreement for the Work will be written on AIA Document A101, Standard Form of Agreement Between Owner and Contractor Where the Basis of Payment Is a Stipulated Sum.

State of West Virginia

Supplementary Instructions to Bidders for AIA Document A701-1997

The following supplements modify, change, delete from or add to the Instructions to Bidders, AIA Document A 701, 1997 Edition. Where any Article, Paragraph, Subparagraph, or Clause of the Instructions to Bidders is modified or deleted by these Supplementary Instructions to Bidders, the unaltered portions of that Article, Paragraph, Subparagraph or Clause shall remain in effect.

ARTICLE 3
BIDDING DOCUMENTS

3.4 ADDENDA

3.4.4 Add the following sentence to Subparagraph 3.4.4:

If the Bidder fails to acknowledge receipt of each Addendum, then the Bid may be rejected.

ARTICLE 4
BIDDING PROCEDURES

4.2 BID SECURITY

4.2.1 Delete the last sentence of Subparagraph 4.2.1.
4.2.2 Delete Subparagraph 4.2.2 in its entirety and substitute the following:

4.2.2 Each Bid shall be accompanied by a certified check payable to the Owner for five percent (5%) of the total Bid, or in lieu of a certified check, a Bid Bond may be provided on the State of West Virginia form included in the Project Manual for five percent (5%) of the total Bid. The attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of power of attorney. Bonds issued by nonresident companies or agencies must be countersigned by a resident agent of the State of West Virginia.

4.3 SUBMISSION OF BIDS

4.3.1 Add the following Clause to Subparagraph 4.3.1:

4.3.1.1 Bids shall be submitted on the Form of Proposal included in the Bidding Documents. Each Bidder should obtain a Request for Bids/Quotations from the party receiving Bids and must follow all instructions contained therein. The Request for Bids/Quotations should be stapled to the front of the Form of Proposal. Each Bid shall be enclosed in a sealed, self addressed, opaque envelope plainly marked with the following information:

SEALED BID

Proposal for: (Project Name)
Buyer File Number:
Request for Bids/Quotations Number:
Time of Bid Opening:
Date of Bid Opening:

The information required above may be obtained from the Request for Bids/Quotations.

4.4 MODIFICATION OR WITHDRAWAL OF BID

4.4.1 Add the following Clause to Subparagraph 4.4.1:

4.4.1.1 Bids may not be modified or withdrawn for a period of sixty (60) days after receipt of Bids without forfeiture of Bid security, not as a penalty but as liquidated damages.

ARTICLE 6
POST-BID INFORMATION

6.2 OWNER'S FINANCIAL CAPABILITY

6.2 Delete Paragraph 6.2 in its entirety.

ARTICLE 7
PERFORMANCE BOND AND PAYMENT BOND

7.1 BOND REQUIREMENTS

7.1.1 Add the following Clause to Subparagraph 7.1.1:

7.1.1.1 The successful Bidder shall furnish a Performance Bond and a Labor and Material Payment Bond for 100% of the contract award and, if applicable, a two year roofing Maintenance Bond for the full value of the roofing system. Bonds issued by nonresident companies or agencies must be countersigned by a resident agent of the State of West Virginia.

7.2 TIME OF DELIVERY AND FORM OF BONDS

7.2.1 Delete Subparagraph 7.2.1 in its entirety and substitute the following:

7.2.1 The successful Bidder shall deliver the required bonds and all other Contract Documents, including Certificates of Insurance, within 15 days after receipt of the Owner's letter of intent to award a Contract. All Contract Documents must be properly executed. Should the successful Bidder fail or refuse to deliver the required bonds and all other Contract Documents, properly executed, within 15 days after receipt of the Owner's notice of intent to award a Contract, the successful Bidder shall forfeit the security deposited with his Bid as liquidated damages , not as a penalty.

7.2.2 Delete Subparagraph 7.2.2 in its entirety and substitute the following:

7.2.2 The bonds shall be written on the State of West Virginia forms bound in the Project Manual and according to the instructions provided with these forms.

Add the following Article 9 to the Instructions to Bidders:

ARTICLE 9
OTHER CONDITIONS

9.1 PREVAILING WAGE RATES

9.1.1 The successful Bidder and all Subcontractors shall pay the higher of the U. S. Department of Labor minimum wage rates or the West Virginia Department of Labor wage rates as established for County in which the Project is located pursuant to West Virginia Code §21-5-1 et. seq. (See applicable West Virginia Department of Labor Wage Rates following Supplementary General Conditions and/or Special Conditions).

9.2 WAGE BOND

9.2.1 Firms engaged in construction work in West Virginia less than five years preceding the date of the Bid shall post a wage bond with the West Virginia Department of Labor.

9.3 CONTRACTOR'S LICENSE

9.3.1 West Virginia Code §21-11-2 requires that all persons desiring to perform contractual work in West Virginia must be duly licensed. The West Virginia Contractor's Licensing Board is empowered to issue the contractor's license. Application for a contractor's license may be made by contacting the West Virginia Department of Labor.

9.3.2 West Virginia Code §21-11-11 requires Bidders to include the Bidder's contractor's license number on its Bid.

9.3.3 The successful Bidder shall furnish a copy of its contractor's license prior to issuance of a Purchase Order/Contract.

9.4 VENDOR REGISTRATION

9.4 The successful Bidder must be a registered vendor with the West Virginia Department of Administration, Purchasing Division, prior to issuance of a purchase order. If the Bidder is not a registered vendor, application should be made to the Purchasing Division. The Bidder should obtain a vendor number prior to the Bid Opening.

9.5 NOTICE TO PROCEED

9.5.1 Any work performed or any materials contracted for prior to receipt of the Owner's written Notice to Proceed and/or Purchase Order shall be at the Bidder's risk.

9.5 CONTRACT TIME

9.5.1 The successful Bidder, as a condition of the Contract, agrees that all Work is to be Substantially Complete within the Contract Time stated in the Invitation to Bid and/or Request for Bids/Quotations.

9.5.2 The Owner will suffer financial loss if the Work is not Substantially Complete within the Contract Time. For each calendar day of delay in achieving Substantial Completion, the Contractor shall be liable for and shall pay the Owner the amount of liquidated damages stated in the Invitation to Bid and/or Request for Bids/Quotations, not as a penalty, but as liquidated damages. Allowances may be made for delays due to shortages of materials and/or energy resources, subject to proof by documentation, and also for delays due to strikes or other delays beyond the control of the Contractor. All delays and any claim for extension of the Contract Time must be properly documented in accordance with the Contract Documents by the Contractor.

END OF SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

APPROVED AS TO FORM THIS 9th
DAY OF April, 1999
DARRELL V. McGRAW, JR.
ATTORNEY GENERAL
BY: Dawn E. Warfield

SECTION 01 1000 - SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. Project Name: Enhancements for the: West Virginia State Museum, Cultural Center, 1900 Kanawha Boulevard East, Charleston, WV 25305

B. Owner's Name: State of West Virginia.

C. The Project consists of the installation/construction of interior enhancements/alterations within the existing museum and adjacent or associated areas of the Cultural Center. The work includes audio and video production and integration necessary to execute the proposed enhancements.

D. The Project is defined on the design and construction drawings dated 6-9-2011 and as specified herein. The contract documents consist of the following:

1. Design Drawings Package, 11” x 17” size.

2. Project Manual including project documents and specifications

3. Construction drawings, 24 x 36” size

E. Contractor is responsible for the entire scope of worked detailed in the bid documents. No exclusions will be allowed.

1.02 SCHEDULING AND COORDINATION

A. The Contractor shall schedule and coordinate all of the work.

B. The Contractor must coordinate all work with the WV Division of Culture and History in order to maintain the appropriate access to all areas of the project and to maintain the correct sequencing and scheduling of all components of the project. The museum will remain open during the installation/construction of the proposed enhancements and alterations.

C. The Contractor must have experience in sequencing, scheduling, and constructing projects similar in size, style, function, and scope.

D. Each Subcontractor shall coordinate their work with work by other Subcontractors and the Contractor.

E. Contractor will not take any existing Museum systems off line without prior approval from the Owner and the Owner’s Representative.

F. Contractor will not block the Show Path (primary egress path, 6 feet in width) at any time during normal Museum operating hours. Proper means of egress must be maintained at all times.

G. Contractor shall not perform any work that may affect Museum humidity levels without prior approval from the Owner and Owner’s Representative.

H. Contractor will cooperate fully with the Owner and the Owner’s Representative regarding any Owner installed items including, but not limited to, artifacts.

I. For RFP purposes, the Contractor shall produce a preliminary detailed schedule that does not exceed 180 days from Notice to Proceed and takes into consideration that the Museum will operate in accordance with their normal operating schedule. 30 days after the Notice to Proceed, the Contractor will revise the **detail** of the schedule (not the overall 180 day duration), if necessary, and re-distribute to the Owner, Owner’s Representative and the entire Project team. This will become the **final** schedule and shall not be revised for the duration of the project.

1.04 LIGHTING DESIGN SCOPE

A. Contractor is to provide the services of a lighting designer, Lighting Certified (LC) by the National Council for the Qualification of Lighting Professionals (NCQLP) and with a minimum of five years experience in theatrical, entertainment and exhibit lighting design. The lighting designer is to have at their disposal a team of four Lighting Focus Technicians and an ETC architectural controller programmer, who is Unison Certified. Under the direction of the lighting designer, this team of professionals is to assess the lighting of the entire existing museum, develop a plan to enhance the lighting quality and refocus, dim and aim all lighting devices as needed to upgrade the quality of the lighting and exhibit presentation using the existing and new lighting instruments. The general mood and times of day or seasons depicted should remain generally as they are.

B. A submission is to be made by the Contractor prior to execution of the work describing the design approach proposed and detailing the quantity and types of color filters and any other materials necessary for the work for Owner and Architect approval

C. The Contractor is to provide all tools and materials necessary for this work. This includes any new color gels or filter lenses necessary to execute the lighting design. As with the entire scope of work indicated in the bid documents the timing of this work is to be coordinated with the Owner to maintain access to the museum during operating hours.

1.05 MICORSOFT SURFACE UNITS

A. Contractor is to provide eight (8) Microsoft surface tables, version 2.0. This is to include hardware, standard operating software and setup/ installation. The Owner will provide content data. Five (5) of the units will be installed in the Museum and Great Hall spaces. Three will be turned over to the Owner for later use/installation.

B. If the Microsoft Surface Table 2.0 has not been released for sale at the time that the bids for the work of this contract are due, the Contractor shall include an amount of $100,000 in his completed bid relative to the cost of furnishing and installing these units.

1.06 CONTRACTOR USE OF SITE AND PREMISES

A. Provide access to and from construction area as required by law and by Owner. All access must be coordinated with the WV Division of Culture and History.

B. Emergency Building Exits During Construction: Keep all exits required by code open during the construction period; provide temporary exit signs and egress lighting if exit routes are temporarily altered.

C. All deliveries must be coordinated with the Owner and Owner's Representative and brought to the Culture Center rear loading dock. Deliveries will enter the Museum through the Museum back of house hallway and lift.

1.07 PERMITS, FEES, AND INSPECTIONS

A. The Owner shall apply and pay for the permit from the State of West Virginia Fire Marshall. In the event any additional permits and fees are required of the General Contractor or any Subcontractor, the General Contractor shall be solely responsible for obtaining such permits and for the payment of any associated fees. The cost of any such additional permits shall be included in the General Contractor's quote.

B. All electrical work must be done by an Electrician licensed in the State of West Virginia.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 3000

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Contractor Designated Representative

B. Preconstruction meeting.

C. Progress meetings.

D. Training

E. Liquidated damages

F. Submittals for review, information, and project closeout.

G. Number of copies of submittals.

H. Submittal procedures.

I. Schedule of submittals.

J. Reviewer's duties.

1.02 RELATED SECTIONS

A. Section 01 7000 (01700) - Execution and Closeout Requirements: Additional coordination requirements.

B. Section 01 7800 (01780) - Closeout Submittals: Project record documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CERTIFICATION

A. Contractor shall provide a Certification Letter signed by the Contractor and stating that they have thoroughly inspected the project site and fully understand the current condition of the Museum and Museum systems, the logistics associated with installing the complete scope of work while the Museum remains in normal operation, and the requirement to largely minimize or eliminate disruption to the ongoing normal operations of the Museum.

3.02 CONTRACTOR REPRESENTATIVE

A. The Contractor shall designate a single point person for the duration of the project.

B. This person shall be responsible for attending all Owner and Progress meetings and should be well versed in all aspects of the Contractor's overall scope of work, schedule and progress.

C. Decision's made by this point person are binding for the Contractor.

D. The point person may not be changed or replaced without Owner approval.

3.03 PRECONSTRUCTION MEETING

A. Owner will schedule a meeting after Notice of Award.

B. Attendance Required:
   1. Owner.
   2. Architect.
   3. Contractor
   4. Major subcontractors, as requested by Owner.

C. Contractor to record minutes and distribute copies within two days after meeting to participants, with one copy to participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

A. Contractor to schedule and administer meetings throughout progress of the Work at maximum monthly intervals.

B. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, as appropriate to agenda topics for each meeting, Architect, as required.

C. Contractor to record minutes and distribute copies within two days after meeting to participants, with one copies to participants, and those affected by decisions made.

3.04 TRAINING

A. The Contractor is responsible for providing the proper training to the Owner's operations and maintenance staff as follows:

1. The first training session will be two days in duration and shall occur immediately after the Site Acceptance Testing (SAT) and must cover the basic operations of the complete scope of work .
2. The second training session will be one day and occur two weeks after the soft opening of all new work, enhancements.
3. The third and final training session shall be one day and occur six weeks after the museum opening of all new work, enhancements. All operations and close out materials shall be provided at this time.
4. Retainage will not be released in full until all training has been completed.

3.05 LIQUIDATED DAMAGES

A. According to West Virginia Code 5A-3-4(8), Contractor agrees that liquidated damages shall be imposed at the rate of $500 per day for failure to meet the final completion date identified in the final approved project schedule. This clause shall in no way be considered exclusive and shall not limit the State or Agency's right to pursue any other additional remedy which the State or Agency may have legal cause for action.

3.06 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
1. Product data.
2. Shop drawings.
3. Samples for selection.
4. Samples for verification.
5. Artwork, scripts and other materials for AV production.

B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

C. Samples will be reviewed only for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 (01780) - CLOSEOUT SUBMITTALS.

3.07 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
1. Design data.
2. Certificates.
3. Test reports.

4. Inspection reports.
5. Manufacturer's instructions.
6. Manufacturer's field reports.
7. Other types indicated.

B. Submit for Architect's information. No action will be taken. Provide 2 copies, one for Architect and one for Owner.

3.08 SUBMITTALS FOR PROJECT CLOSEOUT

A. When the following are specified in individual sections, submit them at project closeout:
1. Project record documents.
2. Operation and maintenance data.
3. Warranties.
4. Bonds.
5. All audio and video production materials and DVD.
6. Other types as indicated.

B. Submit to Owner for Owner's benefit during and after project completion. Provide 2 copies for Owner, unless additional copies are required in the specifications.

3.09 NUMBER OF COPIES OF SUBMITTALS

A. Documents for Review:
1. Small Size Sheets, Not Larger Than 8-1/2 x 11 inches: Submit the number of copies listed in the Schedule of Submittals, unless noted otherwise in the specific section.
2. Larger Sheets, Not Larger Than 30 x 42 inches: Submit the number of copies listed in the Schedule of Submittals, unless noted otherwise in the specific section.

B. Documents for Information: Submit the number of copies listed in the Schedule of Submittals, unless noted otherwise in the specific section. Minimum 2 copies.

C. Documents for Project Closeout: Make one reproduction of submittal originally reviewed. Submit one extra set of submittals for information.

D. Samples: Submit the number specified in individual specification sections; one of which will be retained by Owner.
1. After review, produce duplicates.
2. Retained samples will not be returned to Contractor unless specifically so stated.

3.10 SUBMITTAL PROCEDURES

A. Transmit each submittal with transmittal.

B. Identify Project, Owner, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.

C. Deliver submittals to Contractor for their review. After Contractor reviews the submittals, he is to forward submittals to Architect, as Owner’s representative, for their review.

D. Schedule submittals to expedite the Project, and coordinate submission of related items.

E. For each submittal for review, allow 10 working days excluding delivery time to and from the Architect.

F. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.

G. Provide space for Contractor and Architect review stamps.

H. When revised for resubmission, identify all changes made since previous submission.

I. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

J. Submittals not requested will not be recognized or processed.

3.11 SCHEDULE OF SUBMITTALS

Sect No.	Title	Shop Drawings	Product Data	Sample
Division 1	General Requirements			
01 1000	Summary of Work	NA	NA	NA
01 3000	Administrative Requirements	NA	NA	NA
01 4000	Quality Requirements	NA	NA	NA
01 5000	Temporary Facilities and Controls	NA	NA	NA
01 6000	Product Requirements	NA	NA	NA
01 7000	Execution & Closeout Requirements	NA	NA	NA
01 7800	Closeout Submittals	NA	NA	NA
Division 2	Existing Conditions			
02 4100	Demolition	NA	NA	NA
Division 3	Concrete			
Division 4	Masonry			
Division 5	Metals			
Division 6	Wood, Plastics, and Composites			
06 2000	Finish Carpentry	NA	5	2
		Shop	Product	
Division 7	Thermal and Moisture Protection	Drawings	Data	Samples
07 8400	Firestopping	NA	5	NA
07 9005	Joint Sealants	NA	5	NA
Division 8	Openings			
08 1113	Hollow Metal Door and Frames	5	5	NA
08 3100	Access Doors and Panels	5	5	NA
08 7100	Door Hardware	5	5	NA
Division 9	Finishes			
09 2116	Gypsum Board Assemblies	NA	5	NA
09 5100	Acoustical Ceilings	NA	5	2
09 6500	Resilient Flooring	NA	5	2
09 9000	Painting and Coating	NA	5	2
Division 21 – Fire Suppression				
21 0500	Common Work Results for Fire Suppression	N/A	6	N/A
21 0529	Hangers and Supports for Fire Suppression	N/A	6	N/A
21 1313	Wet Pipe Sprinkler Systems	6	6	N/A
21 1318	Double-Interlock Pre-Action Sprinkler Systems	6	6	N/A
Division 23 – Heating, Ventilating, and Air Conditioning (HVAC)				
Division 26 - Electrical				

26 0001	General Electrical Requirements	N/A	N/A	N/A
26 0002	Basic Electrical Materials and Methods	N/A	N/A	N/A
26 0501	Existing Conditions and Demolition	N/A	N/A	N/A
26 0519	Low Voltage Electric Power Conductors and Cable	N/A	N/A	N/A
26 0521	Electrical Connections	N/A	N/A	N/A
26 0526	Grounding	N/A	6	N/A
26 0529	Supporting Devices	N/A	N/A	N/A
26 0533	Raceways	N/A	N/A	N/A
26 0534	Electrical Boxes and Fittings	N/A	N/A	N/A
26 0580	Mechanical Equipment	N/A	6	N/A
26 2201	Low Voltage Transformers	N/A	6	N/A
26 2416	Panelboards	N/A	6	N/A
26 2726	Wiring Devices	N/A	6	N/A
26 2730	Floor Devices	N/A	6	N/A
26 2740	Disconnects, Starters and Contactors	N/A	6	N/A
26 2813	Fuses	N/A	N/A	N/A
26 4313	Surge Protection	N/A	6	N/A
26 5113	Luminaires	N/A	6	N/A
Division 28 – Electronic Safety and Security				

3.12 REVIEWER'S DUTIES

A. Review of submittals is to determine approval for general conformance with the design concept and contract documents. Approval is not an approval of any deviation from the requirements of the contract documents. The fact that no exceptions may have been taken nor comments or markings have been made on or attached to the submittal shall not relieve the Contractor and Subcontractor/material supplier from compliance with the contract documents nor be construed as authorizing departures there from, nor constitute either expressly or impliedly, a change therein. Changes in the contract documents shall be effected only by a written change order signed by the parties to the original contract agreement. In the event of conflict between the contract documents and submittals, the contract documents shall govern. Contractor, subcontractor, and material supplier remain responsible for details and accuracy, for confirming and correlating quantities and dimensions for selecting fabrication processes, for techniques of assembly, for coordination of work between trades, and for performing work in a safe manner.

B. Where submittals are requested for record only, the Architect will receive and file such submittals for his own record and use, and forward one to the Owner for their records. The Architect or Owner will not necessarily take any action on such submittals unless in his judgment action is required. His not taking action shall in no way imply his approval of any submittal, and shall not relieve the Contractor of his contractual obligation to complete the work in accordance with the contract documents or to provide project record documents as specified elsewhere in the project manual.

C. Review of separate items does not constitute review of an assembly in which items function.

D. Affix stamp, date, and initials or signature certifying to review of submittal, and with instructions for contractor response.

E. Return submittals to Contractor for distribution or for re-submission.

F. Make re-submittals under procedures specified for initial submittals; identify changes made since previous submittal.

END OF SECTION

SECTION 01 4000

QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. References and standards.

B. Quality assurance submittals.

C. Control of installation.

D. Tolerances.

E. Manufacturers' field services.

1.02 RELATED SECTIONS

A. Section 01 3000 (01300) - Administrative Requirements: Submittal procedures.

B. Section 01 6000 (01600) - Product Requirements: Requirements for material and product quality.

1.03 REFERENCES

A. ASTM C 1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2001.

B. ASTM C 1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation; 2005.

C. ASTM C 1093 - Standard Practice for Accreditation of Testing Agencies for Unit Masonry; 1995 (Reapproved 2001).

D. ASTM D 3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2004a.

E. ASTM E 329 - Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction; 2005.

F. ASTM E 543 - Standard Practice for Agencies Performing Nondestructive Testing; 2004.

1.04 SUBMITTALS

A. Design Data: Submit for Owner's knowledge as contract administrator or for the Owner, for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

B. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor to Owner, in quantities specified for Product Data.
   1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
   2. Certificates may be recent or previous test results on material or product, but must be acceptable to Owner.

C. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

D. Manufacturer's Field Reports: Submit reports for Owner's benefit as contract administrator.

1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.05 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have Work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS

A. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.

B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

C. Accepted mock-ups shall be a comparison standard for the remaining Work.

D. Where mock-up has been accepted by Owner and is specified in product specification sections to be removed, remove mock-up and clear area when directed to do so.

3.03 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.05 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not conforming to specified requirements.

B. If, in the opinion of Owner, it is not practical to remove and replace the Work, Owner will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 5000

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary utilities.

B. Temporary telephone service.

C. Temporary sanitary facilities.

D. Temporary Controls: Barriers, enclosures, and fencing.

E. Security requirements.

F. Vehicular access and parking.

G. Waste removal facilities and services: Progress cleaning.

1.02 TEMPORARY UTILITIES

A. Connect to existing power service. Power consumption shall not disrupt Owner's need for continuous service.

B. Coordinate power requirements with Owner. Provide construction type power cords as required.

C. Permanent convenience receptacles may be utilized during construction. Provide flexible power cords as required with GFCI devices to meet OSHA requirements.

D. Coordinate water requirements with Owner. Do not tap into existing water source without prior authorization.

E. Use trigger-operated nozzles for water hoses, to avoid waste of water. These may only be used outside in areas designated by Owner.

1.03 TELEPHONE SERVICE

A. Contractor to provide, maintain, and pay for telephone service to field office at time of project mobilization.

B. Use of Owner's phones is prohibited.

1.04 TEMPORARY LIGHTING

A. Contractor to provide any temporary lighting that is required.

1.05 TEMPORARY HEAT AND LIGHTING

A. Contractor to provide heat and ventilation as required to maintain specified conditions for construction operations, to protect materials and finishes from damage due to temperature and humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

B. Contractor to extend and supplement existing equipment with temporary fan units as required to maintain clean air for construction operations and for protection of operating facilities.

C. Use of permanent heating and ventilating system shall be by Owner's written permission only. Use temporary filters when permanent HVAC system is used prior to project completion, unless directed otherwise by Owner.

1.06 TEMPORARY SANITARY FACILITIES

A. Owner to provide Contractor access to certain restrooms. Contractor to maintain these restrooms with progress cleaning on a daily basis. Owner to designate which restrooms are available for Contractor's use.

1.07 BARRIERS

A. Contractor to provide barriers to prevent unauthorized entry to construction areas, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Contractor to provide barricades and covered walkways required by governing authorities for public access to existing building.

C. Contractor to protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.08 ENCLOSURES

A. Contractor to provide temporary partitions and ceilings necessary to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.

1.09 SUBCONTRACTOR'S FACILITIES

A. Both the Contractor and all of the Subcontractors shall provide storage facilities for their respective operations as required. Location of facilities is subject to approval of Owner.

1.10 SECURITY

A. Contractor to provide security and facilities to protect Work, and Owner's operations from unauthorized entry, vandalism, or theft.

B. Coordinate with Owner's security program.

1.11 FIRE PROTECTION

A. Contractor will provide and maintain fire extinguishers for the duration of work.

B. Provide type of extinguishers appropriate for type of work.

1.12 VEHICULAR ACCESS AND PARKING

A. Coordinate access and access routes with Owner.

B. Provide and maintain access to fire hydrants, free of obstructions.

C. Coordinate location of construction parking with Owner.

D. Provide approved list of Contractors/Subcontractors to Owner for access to parking lot.

1.13 WASTE REMOVAL

A. Contractor to provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

B. Contractor to provide containers. Remove trash from site daily.

C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

1.13 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing facilities used during construction to original condition.

D. Remove temporary HVAC filters and install new filters.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 6000

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General product requirements.

B. Re-use of existing products.

C. Transportation, handling, storage and protection.

D. Product option requirements.

E. Substitution limitations and procedures.

F. Procedures for Owner-supplied products.

G. Spare parts and maintenance materials.

1.02 RELATED SECTIONS

A. Section 01 4000 (01400) - Quality Requirements: Product quality monitoring.

1.03 SUBMITTALS

A. Proposed Products List: Submit to Architect a list of major products proposed for use, as required, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 30 days after date of Notice to Proceed.
   2. For products specified only by reference standards, list applicable reference standards.

B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Owner.

D. Reused Products: Reused products include materials and equipment previously used in this or other construction, salvaged and refurbished as specified.

2.02 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by the Contract Documents.

B. Do not use products having any of the following characteristics:
   1. Made using or containing CFC's or HCFC's.

2.03 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

2.04 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Provide spare parts, maintenance, and extra products of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION PROCEDURES

A. The products specifically stated herein are strongly preferred. Interested bidders should make every possible effort to bid and provide the preferred products.

3.02 OWNER-SUPPLIED PRODUCTS

A. Owner's Responsibilities:
   1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
   2. Arrange and pay for product delivery and unloading at site.
   3. On delivery, Owner to inspect products jointly with Contractor.
   4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
   5. Pay for proper installation of same, unless indicated otherwise on the Construction Documents.
   6. Arrange for manufacturers' warranties, inspections, and service.

B. Contractor's Responsibilities:
   1. Review Owner reviewed shop drawings, product data, and samples.
   2. Inspect for completeness or damage jointly with Owner.

3.03 TRANSPORTATION AND HANDLING

A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

B. Transport and handle products in accordance with manufacturer's instructions.

C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

F. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.04 STORAGE AND PROTECTION

A. Owner to designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.

G. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

H. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

I. Prevent contact with material that may cause corrosion, discoloration, or staining.

J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 7000

EXECUTION & CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Cutting and patching.

C. Surveying for laying out the work.

D. Cleaning and protection.

E. Starting of systems and equipment.

F. Demonstration and instruction of Owner personnel.

G. Closeout procedures, except payment procedures.

1.02 RELATED SECTIONS

A. Section 01 3000 (01300) - Administrative Requirements: Submittals procedures.

B. Section 01 4000 (01400) - Quality Requirements: Testing and inspection procedures.

C. Section 01 5000 (01500) - Temporary Facilities and Controls: Temporary exterior enclosures.

D. Section 01 7800 (01780) - Closeout Submittals: Project record documents, operation and maintenance data, warranties and bonds.

E. Section 02 4100 (02225) - Demolition: Demolition of whole structures and parts thereof; site utility demolition.

1.03 SUBMITTALS

A. See Section 01 3000 (01300) - Administrative Requirements, for submittal procedures.

B. Cutting and Patching: Submit written request in advance of cutting or alteration which affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Visual qualities of sight exposed elements.
   5. Work of Owner or separate Subcontractor.
   6. Include in request:
      a. Identification of Project.
      b. Location and description of affected work.
      c. Necessity for cutting or alteration.
      d. Description of proposed work and products to be used.
      e. Effect on work of Owner or separate Subcontractor.

C. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.04 QUALIFICATIONS

A. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in the State in which the Project is located.

1.05 PROJECT CONDITIONS

A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000 (01600).

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 LAYING OUT THE WORK

A. Verify locations of reference control points prior to starting work.

B. Promptly notify Architect of any discrepancies discovered when laying out work.

C. Contractor will locate and protect reference control points. Periodically verify layouts by same means.

3.04 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.05 CUTTING AND PATCHING

A. Execute cutting and patching including excavation and fill to complete the work, to uncover work in order to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit products together to integrate with other work.

B. Execute work by methods to avoid damage to other work, and which will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

C. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

D. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

E. Restore work with new products in accordance with requirements of Contract Documents.

F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

G. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 8400 (07840), to full thickness of the penetrated element.

H. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

I. Make neat transitions. Patch work to match adjacent work in texture and appearance. Where new work abuts or aligns with existing, perform a smooth and even transition.

3.06 PROGRESS CLEANING

A. Contractor shall execute cleaning during progress of the work and at completion of the work as it relates to their portion of the work on a daily basis.

B. Contractor shall maintain the premises and public properties free from accumulations of waste, debris, and rubbish caused by their construction operations on a daily basis.

C. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition at all times.

D. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

E. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

F. Collect and remove waste materials, debris, and trash/rubbish from site daily and dispose off-site; do not burn or bury.

G. Wet down materials and rubbish to lay dust and to prevent blowing dust.

H. Contractor to provide on-site containers for collection of waste materials, debris, and rubbish.

3.07 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate

work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

3.08 STARTING SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems.

B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.

C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

D. Verify that wiring and support components for equipment are complete and tested.

E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

F. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

G. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.09 DEMONSTRATION AND INSTRUCTION

A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

C. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of owner personnel.

D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

3.10 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.11 FINAL CLEANING

A. Contractor to execute final cleaning after Substantial Completion but before making final application for payment.

B. Clean filters of operating equipment.

D. Clean entire area of new work. Restore existing areas that have been damaged or dirtied due to construction operations.

E. Contractor to remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.12 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Owner.

B. Notify Architect when work is considered ready for Substantial Completion.

C. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Owner's review.

D. Correct items of work listed in executed Certificates of Substantial Completion and comply with requirements for access to Owner-occupied areas.

E. Notify Architect when work is considered finally complete.

F. Complete items of work determined by Architect's final inspection.

3.13 MAINTENANCE SERVICE

A. Furnish service and maintenance of components indicated in specification sections for one year from date of Substantial Completion.

B. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

C. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

D. Maintenance service shall not be assigned or transferred to any agent or Subcontractor without prior written consent of the Owner.

END OF SECTION

SECTION 01 7800

CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Operation and Maintenance Data.

B. Warranties and bonds.

1.02 RELATED SECTIONS

A. Section 01 3000 (01300) - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Section 01 7000 (01700) - Execution and Closeout Requirements: Contract closeout procedures.

C. Individual Product Sections: Specific requirements for operation and maintenance data.

D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.

B. Operation and Maintenance Data:
   1. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   2. Submit 1 copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect's comments. Revise content of all document sets as required prior to final submission.
   3. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:
   1. Submit a letter signed by an officer of each Subcontrator's company, on their letterhead, certifying that the entire installation would be covered under a material and labor warranty for a period of one (1) year, commencing on the date of final acceptance.
   2. Each Subcontractor to provide originals of manufacturer's warranties on specific materials and equipment in Owner's name.
   3. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.
   4. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
   5. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 OPERATION AND MAINTENANCE DATA

A. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.02 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:
   1. Product data, with catalog number, size, composition, and color and texture designations.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Additional information as specified in individual product specification sections.

3.03 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. Supply 3 sets of O&M data; one for record, one for Manager for Facility Operations, and one for Maintenance Supervisor, to aid in troubleshooting and parts reference.

B. O&M material, wherever practical, shall be placed in 3 ring binders, maximum spin size 3 inches, with face and spine pouches, tabbed by Section or Division, and shall include a Table of Contents for quick reference.

C. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.
   3. Include performance curves, with engineering data and tests.
   4. Complete nomenclature and model number of replaceable parts.

D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

E. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

F. Provide servicing and lubrication schedule, and list of lubricants required.

G. Include manufacturer's printed operation and maintenance instructions.

H. Include sequence of operation by controls manufacturer.

I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

J. Provide control diagrams by controls manufacturer as installed.

K. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

L. Include test and balancing reports.

M. Additional Requirements: As specified in individual product specification sections.

3.04 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

END OF SECTION

SECTION 02 4100

DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of building elements for alterations purposes.

B. Abandonment and removal of existing utilities.

1.02 RELATED SECTIONS

A. Section 01 1000 (01100) - Summary: Sequencing and staging requirements.

B. Section 01 5000 (01500) - Temporary Facilities and Controls: Security, protective barriers, and waste removal.

C. Section 01 6000 (01600) - Product Requirements: Handling and storage of items removed for salvage and relocation.

D. Section 01 7000 (01700) - Execution and Closeout Requirements: Project conditions; protection of control reference points, and existing construction to remain; reinstallation of removed products.

1.03 REFERENCES

A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2004.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 SCOPE

A. Remove portions of existing buildings as indicated on drawings.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Comply with applicable requirements of NFPA 241.
   3. Use of explosives is not permitted.
   4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   5. Provide, erect, and maintain temporary barriers and security devices.
   6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
   7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   8. Do not close or obstruct roadways or sidewalks without permit.
   9. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
   10. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from Owner.

C. Protect existing structures and other elements that are not to be removed.
   1. Provide bracing and shoring.
   2. Prevent movement or settlement of adjacent structures.
   3. Stop work immediately if adjacent structures appear to be in danger.

D. If hazardous materials are discovered during removal operations, stop work and notify Architect; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

E. Perform demolition in a manner that maximizes salvage and recycling of materials.
   1. Dismantle existing construction and separate materials.
   2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.
   3. Verify items that need to be reused of salvaged with Owner before proceeding with demolition.

3.03 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

D. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 7 days prior written notification to Owner.

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as shown.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of demolition work constitutes acceptance of existing conditions.

B. Separate areas in which demolition is being conducted from other areas that are still occupied.
   1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 5000 (01500) as necessary.

C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.

D. Remove existing work as indicated and as required to accomplish new work.
   1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
   2. Remove items indicated on drawings.

E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
   2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
   3. Verify that abandoned services serve only abandoned facilities before removal.
   4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.

F. Protect existing work to remain.
   1. Prevent movement of structure or exhibits, provide shoring and bracing if necessary.

2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.
4. Patch as specified for patching new work.

3.05 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Remove from site all materials not to be reused on site; do not burn or bury.

C. Leave site in clean condition, ready for subsequent work.

D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 06 2000

FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Finish carpentry items.

B. Door trim, glazed frames.

C. Wood casings and moldings.

D. Hardware and attachment accessories.

1.02 RELATED SECTIONS

A. Section 08 1416 (08211) - Flush Wood Doors.

B. Section 08 8000 (08800) - Glazing: Glass and glazing of wood partitions and screens.

C. Section 09 9000 (09900) - Painting and Coating: Painting and finishing of finish carpentry items.

1.03 REFERENCES

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test; 2004.

C. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2005.

D. AWI/AWMAC (QSI) - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2003.

E. BHMA A156.9 - American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association; 2003 (ANSI/BHMA A156.9).

1.04 SUBMITTALS

A. See Section 01 3000 (01300) - Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, accessories.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Custom grade.

1.06 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire retardant requirements.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Protect work from moisture damage.

1.08 PROJECT CONDITIONS

A. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

B. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.

PART 2 PRODUCTS

2.01 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

B. Wood Trim – all other areas.
   1. Exposed wood trim shall be natural clear fir or poplar.
   2. Sizes as indicated on drawings.

C. Wood Siding
   1. Exposed wood siding to be Western Red Cedar.
   2. This includes all types of siding.
      a. Lap siding.
      b. See drawings for dimensions and profiles of different siding.
   3. Flame spread rating of siding to be <75. Flame spread class to be Class II.
   4. Any siding that does not meet the Class II flame spread rating shall be fire retardant treated, so that it meets Class II requirements.
   5. Wood Trim, such as jambs, sills, corner boards, battens, bead board ceiling, etc, can be Class III rated (Flame spread 76 to 200).

E. Beaded board ceiling panels
   1. Georgia Pacific, “Ply-Bead Classic” bead board plywood panels.
   2. 4’x8’ panels.
   3. 11/32” thickness.
   4. 1.6” o/c routed bead pattern.
   5. Sanded surface.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

A. Set and secure materials and components in place, plumb and level.

B. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

C. Install hardware in accordance with manufacturer's instructions.

3.03 PREPARATION FOR SITE FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

B. Site Finishing: See Section 09 9000 (09900).

C. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.04 ERECTION TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION

SECTION 07 8400

FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Firestopping materials.

B. Firestopping of all penetrations and interruptions to fire rated assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 RELATED SECTIONS

A. Section 01 7000 (01700) - Execution and Closeout Requirements: Cutting and patching.

B. Section 09 2116 (09260) - Gypsum Board Assemblies: Gypsum wallboard.

1.03 REFERENCES

A. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2000a.

B. ASTM E 814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops; 2002.

C. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.

D. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.

E. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

A. See Section 01 3000 (01300) - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on product characteristics.

C. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs which provide the specified fire ratings when tested in accordance with methods indicated.
   1. Listing in the current classification or certification books of UL, FM, or ITS (Warnock Hersey) will be considered as constituting an acceptable test report.
   2. Current evaluation reports published by CABO, ICBO, or BOCA will be considered as constituting an acceptable test report.
   3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 MATERIALS

A. Safing Insulation
   1. Acceptable manufacturers:
      a. Owens Corning, Safing Insulation / MW.
      b. United States Gypsum, Thermafiber Safing Insulation.
      c. Substitutions: See Section 01 6000 (01600) - Product Requirements.
   2. Spindle fasteners: Galvanized spindle on flat metal base, self-adhering backing, or mastic installed.

B. Primers, Sleeves, Forms, and Accessories: Type required for tested assembly design.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter which may affect bond of firestopping material.

B. Remove incompatible materials which may affect bond.

C. Install backing materials to arrest liquid material leakage.

3.03 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

3.04 CLEANING AND PROTECTION

A. Clean adjacent surfaces of firestopping materials.

B. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 9005

JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sealants and joint backing.

B. Precompressed foam sealers.

1.02 RELATED SECTIONS

A. Section 04 2001 – 4” Brick Veneer: Sealants required in conjunction with this section.

B. Section 04 7200 - Thin Cast Stone Veneer: Sealants required in conjunction with this section.

C. Section 04 7300 – 4” Manufactured Stone Veneer: Sealants required in conjunction with this section.

D. Section 08 8000 - Glazing: Glazing sealants and accessories.

1.03 REFERENCES

A. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants; 2002.

B. ASTM C 1193 - Standard Guide for Use of Joint Sealants; 2005.

C. ASTM D 1667 - Standard Specification for Flexible Cellular Materials--Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam); 1997.

D. BAAQMD 8-51 - Bay Area Air Quality Management District Regulation 8, Rule 51, Adhesive and Sealant Products; www.baaqmd.gov; current edition.

E. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; www.aqmd.gov.

1.04 SUBMITTALS

A. See Section 01 3000 (01300) - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating sealant chemical characteristics.

C. Samples: Submit two samples, 1/4 x 2 inch in size illustrating sealant colors for selection.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing the work of this section with minimum two years experience.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.07 COORDINATION

A. Coordinate the work with all sections referencing this section.

1.08 WARRANTY

A. See Section 01 7800 (01780) - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a five year period after Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 SEALANTS

A. Sealants and Primers - General: Provide only products having lower volatile organic compound (VOC) content than required by the more stringent of the South Coast Air Quality Management District Rule No.1168 and the Bay Area Air Quality Management District Regulation 8, Rule 51.

B. Type 1 - Joint Sealant: Polyurethane; ASTM C 920, Grade NS, Class 25, Uses M, G, and A; multi- component.
   1. Color: To match adjacent surfaces. Submit color to Architect for approval.
   2. Products:
      a. Dynatrol II manufactured by Pecora Corp.
      b. NP2 manufactured by Degussa/Sonneborn.
      c. Dymeric 511 manufactured by Tremco.

C. Type 2 - Joint Sealant: Silicone base, non-acid curing, medium modulus, one component, non-sag; ASTM C 920, Type S, Grade NS, Class 25, with joint movement capability of +/- 50%.
   1. Color: To match adjacent surfaces. Submit color to Architect for approval.
   2. Products:
      a. 795 Silicone Building Sealant manufactured by Dow Corning Corp.
      b. Silpruf Weatherproofing Sealant manufactured by General Electric Corp.
      c. Spectrem 2 Silicone Construction Sealant manufactured by Tremco.

D. Type 3 - Joint Sealant: Silicone base, non-acid curing, low modulus, one component, non-sag; ASTM C 920, Type S, Grade NS, Class 25, with joint movement capability of +/- 100%, 150%.
   1. Color: To match adjacent surfaces. Submit color to Architect for approval.
   2. Products:
      a. 790 Silicone Building Sealant manufactured by Dow Corning Corp.
      b. Spectrem 1 Silicone Construction Sealant manufactured by Tremco.

E. Type 4 - Joint Sealant: Polyurethane base, one component, non-sag; ASTM C 920, Type S, Grade NS, Class 25.
   1. Color: To match adjacent surfaces. Submit color to Architect for approval.
   2. Products:
      a. Dynatrol I-XL manufactured by Pecora Corp.
      b. NP1 manufactured by Degussa/Sonneborn.
      c. Dymonic manufactured by Tremco.

F. Type 5 - Joint Sealant: Polyurethane base, multi-component, self-leveling; ASTM C 920, Type M, Grade P, Class 25.
   1. Color: To match adjacent surfaces. Submit color to Architect for approval.
   2. Products:
      a. NR-200 Urexpan Sealant manufactured by Pecora Corp.
      b. Sonolastic Paving Joint Sealant manufactured by Degussa/Sonneborn.
      c. THC-900 manufactured by Tremco.

G. Type 6 - Joint Sealant: Silicone base, acid curing, high modulus, one component, non-sag; ASTM C 920, Type S, Grade NS, Class 25.
   1. Color: To match adjacent surfaces. Submit color to Architect for approval.
   2. Products:
      a. 786 Mildew Resistant Silicone Sealant manufactured by Dow Corning Corp.
      b. SCS 1702 Sanitary Sealant manufactured by General Electric Corp.

H. Type 7 - Joint Sealant: Acrylic-latex sealant compound; ASTM C 834.
   1. Color: To match adjacent surfaces. Submit color to Architect for approval.
   2. Products:

a. AC-20+ Silicone Sealant manufactured by Pecora Corp.
b. Sonolac manufactured by Degussa/Sonneborn.
c. Tremflex 834 manufactured by Tremco.

I. Type 8 - Joint Sealant: Solvent base acrylic, single component, non-sag; ASTM C 920, Type S, Grade NS, Class 12-1/2.
1. Color: To match adjacent surfaces. Submit color to Architect for approval.
2. Products:
a. Mono 555 manufactured by Tremco.

J. Type 9 - Joint Sealant: Pre-compressed foam sealant tape; densit of 8-10 pcf.
1. Color: To match adjacent surfaces. Submit color to Architect for approval.
2. Products:
a. Will-Seal 150 manufactured by Will-Seal Construction Foams.

2.02 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

A. Remove loose materials and foreign matter which might impair adhesion of sealant.

B. Clean and prime joints in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C 1193.

D. Protect elements surrounding the work of this section from damage or disfigurement.

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C 1193.

C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.

D. Install bond breaker where joint backing is not used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

G. Tool joints concave.

H. Precompressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface.

3.04 CLEANING

A. Clean adjacent soiled surfaces. Only use cleaning materials recommended by sealant manufacturer.

3.05 PROTECTION OF FINISHED WORK

A. Protect sealants until cured.

3.06 SCHEDULE

A. Interior Joints:
   1. Expansion and control joints on the interior side of exterior wall surfaces (Types 1, 2).
   2. Interior perimeters of exterior openings where metal frames meet exterior building facade (Types 1, 2, 4).
   3. Perimeters of interior frames (Type 7).
   4. Masonry vertical control joints (Types 1, 2, 4).
   5. Interior stone joints (Type 1)
   6. Expansion and control joints in horizontal wearing surfaces (Type 5).
   7. Interior perimeters of mechanical and electrical items, which penetrate the exterior building facade (Types 1, 2, 4).
   8. Perimeters of plumbing fixtures and vanities, and vertical joints exposed in wet areas (Type 6).

B Exterior Joints:
   1. Perimeters of openings where aluminum frame meets slab edge. (Types 1, 2, 4, 8).
   2. Perimeters of mechanical and electrical items, which penetrate the exterior building facade (Types 1, 2, 4, 8).
   3. Door thresholds (Type 4).

END OF SECTION

SECTION 08 1113

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Steel doors.

B. Steel frames for steel doors, non-fire rated.

C. Accessories, including matching panels.

1.02 RELATED SECTIONS

A. Section 08 7100 (08710) - Door Hardware.

B. Section 09 9000 (09900) - Painting and Coating: Field painting.

1.03 REFERENCES

A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 1998.

B. ANSI A250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames; 2003.

C. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 1998.

D. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2004a.

E. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware; Door and Hardware Institute; 2000 (ANSI/DHI A115 Series).

F. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 1999.

G. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

H. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; 1998.

1.04 SUBMITTALS

A. See Section 01 3000 (01300) - Administrative Requirements for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced grade standard.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.

D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

E. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Maintain at the project site a copy of all reference standards dealing with installation.

1.06 DELIVERY, STORAGE, AND PROTECTION

A. Store in accordance with NAAMM HMMA 840.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Steel Doors and Frames:
   1. Ceco Door Products: www.cecodoor.com.
   2. Republic Builders Products: www.republicdoor.com.
   3. Steelcraft: www.steelcraft.com.
   4. Substitutions: See Section 01 6000 (01600) - Product Requirements.

2.02 DOORS AND FRAMES

A. Requirements for All Doors and Frames:
   1. Accessibility: Comply with ANSI/ICC A117.1.
   2. Door Top Closures: Flush with top of faces and edges.
   3. Door Edge Profile: Beveled on both edges.
   4. Door Texture: Smooth faces.
   5. Hardware Preparation: In accordance with DHI A115 Series, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
   6. Finish: Factory primed, for field finishing.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 STEEL DOORS

A. Interior Doors Type, Non-Fire-Rated:
   1. Grade: ANSI A250.8 Level 1, physical performance Level C, Model 1, full flush.
   2. Thickness: 18 gauge steel.
   3. Finish: Phosphatized and prime painted in accordance with SDI 100.
   4. Core: Cardboard honeycomb.

B. Panels: Same construction, performance, and finish as doors.

2.04 STEEL FRAMES

A. General:
   1. Comply with the requirements of grade specified for corresponding door, except:
      a. Frames for Wood Doors: Comply with frame requirements specified in ANSI A250.8 for Level 1, 18 gage
   2. Finish: Same as for door.
   3. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
   4. Frames Wider than 48 Inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

B. Non-Fire Rated Interior Door Frames: Knock-down type.
   1. Terminated Stops: Provide at all interior doors; closed end stop terminated 6 inches above floor at 45 degree angle.

2.05 ACCESSORY MATERIALS

A. Grout for Frames: Portland cement grout of maximum 4-inch slump for hand troweling; thinner pumpable grout is prohibited.

2.06 FINISH MATERIALS

A. Primer: Rust-inhibiting, complying with ANSI A250.10, door manufacturer's standard.

B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

3.02 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.

B. In addition, install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction.

D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

E. Coordinate installation of hardware.

F. Coordinate installation of electrical connections to electrical hardware items.

G. Touch up damaged factory finishes.

3.04 ERECTION TOLERANCES

A. Clearances Between Door and Frame: As specified in ANSI A250.8.

B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.05 ADJUSTING

A. Adjust for smooth and balanced door movement.

3.06 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 08 3100

ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Access door and frame units, non-fire-rated, in wall locations.

1.02 RELATED SECTIONS

A. Section 09 9000 (09900) - Painting and Coating: Field paint finish.

1.03 SUBMITTALS

A. See Section 01 3000 (01300) - Administrative Requirements, for submittal procedures.

B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

C. Shop Drawings: Indicate exact position of all access door units.

D. Manufacturer's Installation Instructions: Indicate installation requirements.

E. Project Record Documents: Record actual locations of all access units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Access Doors:
   1. Larsen Manufacturing L-DWC Access Panel.
      http://www.larsensmfg.com/access_panels/index.html
   2. Substitutions: See Section 01 6000 (01600) - Product Requirements.

2.02 ACCESS DOORS AND PANELS

A. All Units: Factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies units are to be installed in.

B. Panel to be 14 gauge cold rolled steel, and to be flush with drywall surface.

C. Panel to have flush screwdriver cam for locking.

D. Size to be square and appropriate for each use. 8” square minimum..

E. Panel to be gray primed cold rolled steel to be finish painted in field.

F. Outer frame to be 16 gauge cold rolled steel, and have a 22 gauge galvanized drywall taping bead, so that the joint compound can be applied in sufficient thickness to cover and conceal the frame.

G. When installed properly, only the door panel remains exposed.

2.03 FABRICATION

A. Weld, fill, and grind joints to ensure flush and square unit.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that rough openings are correctly sized and located.

3.02 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in openings. Secure rigidly in place.

C. Position units to provide convenient access to the concealed work requiring access.

END OF SECTION

SECTION 08 7100

DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hardware for wood and hollow steel doors.

B. Hardware for fire-rated doors.

C. Lock cylinders for doors for which hardware is specified in other sections.

D. Thresholds.

E. Weatherstripping, seals and door gaskets.

1.02 RELATED SECTIONS

A. Section 08 1113 (08110) - Hollow Metal Doors and Frames.

B. Section 08 1416 (08211) - Flush Wood Doors.

C. Section 08 4313 (08410) - Aluminum-Framed Storefronts: Hardware for same except cylinders; installation of cylinders.

1.03 REFERENCES

A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 1998.

B. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware; Door and Hardware Institute; 2000.

C. DHI A115W Series - Specifications for Wood Door and Frame Preparation for Hardware; Door and Hardware Institute; 2000.

D. NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association; 1999.

E. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures; National Fire Protection Association; 2006.

F. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

A. See Section 01 3000 (01300) - Administrative Requirements, for submittal procedures.

B. Shop Drawings:
   1. Indicate locations and mounting heights of each type of hardware, schedules, catalog cuts.

C. Samples:
   1. Submit 1 sample of hinge, latchset, lockset, and closer illustrating style, color, and finish.
   2. Samples will be returned to supplier.

D. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

E. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

F. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.

G. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in

Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND PROTECTION

A. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

1.07 COORDINATION

A. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware.

B. Furnish templates for door and frame preparation.

C. Coordinate Owner's keying requirements during the course of the Work.

1.08 WARRANTY

A. See Section 01 7800 (01780) - Closeout Submittals, for additional warranty requirements.

B. Provide five year warranty for door closers.

1.09 MAINTENANCE PRODUCTS

A. Provide special wrenches and tools applicable to each different or special hardware component.

B. Provide maintenance tools and accessories supplied by hardware component manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. **B - Butts**:
   1. Provide one pair of butt hinges for each door leaf up to and including 60" high. Provide one additional butt for each additional 30", or fraction thereor, of door height.
   2. Hinges to be 5-knuckle, 2 ball bearing, button tip, full mortise template type butts with non-rising loose pins and ball bearings conforming to ANSI A 156.1 and as follows:
      a. Provide doors greater than 3' in width with hinges 5" high.
      b. Provide non-removable pins on reverse bevel doors that have locks and all exterior doors.
      c. Where required to clear trim or permit doors to swing 180 degrees, furnish hinges of sufficient throw.
      d. Interior: Hager, Model # BB 1279.

B. Lock and Latch Sets:
   1. General:
      a. To the maximum extent possible, locksets, latchsets, and deadlocks shall be the products of a single manufacturer.
   2. Medeco High Security Locksets. www.medeco.com.
   3. **SL - Storage Lockset:** Medeco 19 Series Cylindrical Lever Lock - ANSI # F86.

C. **CL - Closers:**
   1. For wood, hollow metal, and aluminum storefront doors: Surface mounted, non-handed, delay action (handicapped accessible).
      a. LCN 1460 Series. www.lcnclosers.com.
   2. Full glass doors: Dorma RTS concealed overhead closers with 90 degree hold opens.

D. **FS - Floor stop:**

1. Glynn-Johnson # 15B half-dome stop with silencer.

E. Door Silencers:
1. Provide three silencers at strike jamb of single doors and two silencers at tops of frames of double doors. Install silencers on all doorframes except frames receiving weatherstripping or gaskets.

F. Other materials:
1. All other materials such as brackets, fasteners, back-up plates, and other accessories not specifically described but required for a complete, operable installation, shall be as selected by the contractor and subject to approval.

G. Substitutions: See Section 01 6000 (01600) - Product Requirements.

2.02 GENERAL REQUIREMENTS FOR DOOR HARDWARE PRODUCTS

A. Provide products that comply with the following:
1. Applicable provisions of Federal, State, and local codes.
2. ANSI/ICC A117.1, American National Standard for Accessible and Usable Buildings and Facilities.
3. Applicable provisions of NFPA 101, Life Safety Code.
4. Fire-Rated Doors: NFPA 80.
5. All Hardware on Fire-Rated Doors: Listed and classified by UL as suitable for the purpose specified and indicated.
6. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.

B. Finishes: USD26, Satin Chrome.

2.03 KEYING

A. Door Locks: Master keyed.
1. Include construction keying.

B. Supply keys in the following quantities:
1. 5 master keys.
2. 5 construction keys.
3. 3 change keys for each lock.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that doors and frames are ready to receive work and dimensions are as indicated on shop drawings.

B. Verify that electric power is available to power operated devices and of the correct characteristics.

3.02 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and applicable codes.

B. Use templates provided by hardware item manufacturer.

C. Install hardware on fire-rated doors and frames in accordance with code and NFPA 80.

3.03 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01 4000 (01400).

3.04 ADJUSTING

A. Adjust work under provisions of Section 01 7000 (01700).

B. Adjust hardware for smooth operation.

3.05 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Section 01 7000 (01700).

B. Do not permit adjacent work to damage hardware or finish.

3.06 SCHEDULE - See drawings.

END OF SECTION

SECTION 09 2116

GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal stud wall framing.

B. Acoustic insulation.

C. Gypsum wallboard.

1.02 RELATED SECTIONS

A. Section 06 1000 – Rough Carpentry: Concealed FRT wood blocking in metal stud walls.

1.03 REFERENCES

A. ASTM C 645 - Standard Specification for Nonstructural Steel Framing Members; 2004a.

B. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2001.

C. ASTM C 754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2004.

D. ASTM C 840 - Standard Specification for Application and Finishing of Gypsum Board; 2004a.

E. ASTM C 1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2004.

F. ASTM C 1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2004.

G. ASTM C 1396/C 1396M - Standard Specification for Gypsum Board; 2004.

H. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2004.

I. ASTM E 413 - Classification for Rating Sound Insulation; 2004.

J. GA-226 - Application of Gypsum Board to Form Curved Surfaces; Gypsum Association; 1996.

1.04 SYSTEM DESCRIPTION

A. Acoustic Attenuation for Interior Partitions Indicated as Acoustic: STC of 45-49 calculated in accordance with ASTM E 413, based on tests conducted in accordance with ASTM E 90.

1.05 SUBMITTALS

A. See Section 01 3000 (01300) - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on metal framing.

C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

1.06 QUALITY ASSURANCE

A. Perform in accordance with ASTM C 840.

PART 2 PRODUCTS

2.01 METAL FRAMING MATERIALS

A. Manufacturers - Metal Framing, Connectors, and Accessories:
   1. Clark Steel Framing Systems: www.clarksteel.com.
   2. Dietrich Metal Framing: www.dietrichindustries.com.
   3. Marino-Ware: www.marinoware.com.
   4. Substitutions: See Section 01 6000 (01600) - Product Requirements.

B. Metal Framing Connectors and Accessories:
   1. Same manufacturer as framing.
   2. The Steel Network Inc: www.SteelNetwork.com.
   3. Slide clips: Vertical bypass slide clips for non-loadbearing walls: “Verticlip SLB”, 68 mils min., 50 ksi. or SLP-TRK, 33 mils min., 33 ksi. Install per manufacturer’s recommendations. Substitutes may be considered, submit manufacturer’s data prior to installation.
   4. Stud clips: “stiffclip lb” series, 68 mils min., 50 ksi. Install per manufacturer’s recommendations.
   5. Substitutions: See Section 01 6000 (01600) - Product Requirements.

C. Framing System Components: ASTM C 645; galvanized sheet steel, of size and properties necessary to comply with ASTM C 754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
   1. Studs: "C" shaped with flat or formed webs.
   2. Runners: U shaped, sized to match studs.
   3. Ceiling Channels: C shaped.
   4. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
   5. Unless noted otherwise, all framing members shall have 1-5/8" flange width, and all track shall have 1-1/4” flange width. All stud/joist members shall have flange lip.

D. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and fastened as indicated on drawings.

2.02 GYPSUM BOARD MATERIALS

A. Manufacturers:
   1. G-P Gypsum Corporation: www.gp.com/gypsum.
   2. National Gypsum Company: www.nationalgypsum.com.
   3. USG: www.usg.com.
   4. Substitutions: See Section 01 6000 (01600) - Product Requirements.

B. Gypsum Wallboard: ASTM C 1396/C 1396M. Sizes to minimize joints in place; ends square cut.
   1. Regular Type:
      a. Application: Use for vertical surfaces, unless otherwise indicated.
      b. Thickness: 5/8 inch.
      c. Edges: Tapered.

2.03 ACCESSORIES

A. Acoustic Insulation: ASTM C 665; preformed glass fiber, friction fit type, unfaced.

B. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board.

C. Finishing Accessories: ASTM C 1047, galvanized steel or rolled zinc, unless otherwise indicated.
   1. Types: As detailed or required for finished appearance.

D. Screws: ASTM C 1002; self-piercing tapping type; cadmium-plated for exterior locations.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

A. Metal Framing: Comply with ASTM C 754 and manufacturer's instructions.

B. Suspended Ceilings and Soffits: Space framing and furring members at 24 inches on center.
   1. Level ceiling system to a tolerance of 1/1200.
   2. Install bracing as required at exterior locations to resist wind uplift.

C. Studs: Space studs as indicated.
   1. Extend partition framing to structure where indicated and to ceiling in other locations.
   2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
   3. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.
   4. Cut all framing components so they fit squarely together. Studs must bear tight against track web. Members shall be held positively in place until properly fastened. Brace wall components as required during erection to prevent racking and distortion.

D. Fastening of components shall be with self-drilling screws or welding. All welded connections shall be made by welders certified for welding members of gage being used per AWS d.1.3-98.

E. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

F. Blocking: Install blocking for support of wall cabinets, artifacts, and other wall hung items. Bolt or screw steel channels to studs.

3.03 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

3.04 GYPSUM BOARD INSTALLATION

A. Comply with ASTM C 840. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

C. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of listing authority.

D. Installation on Metal Framing: Use screws for attachment of all gypsum board.

E. Installation on Wood Framing: For non-rated assemblies, install as follows:
   1. Single-Layer Applications: Screw attachment.

F. Curved Surfaces: Apply gypsum board to curved substrates in accordance with GA-226.

G. Level 5 finish required at all surfaces to be projected on. Level 4 finish typical in all other locations.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.

1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
2. At soffits, not more than 30 feet apart in both directions.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

3.06 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 5100

ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

1.02 RELATED SECTIONS

A. Section 07 9005 (07900) - Joint Sealers: Acoustical sealant.

1.03 REFERENCES

A. ASTM C 636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels; 2004.

B. ASTM E 580 - Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint; 2002.

C. ASTM E 1264 - Standard Classification for Acoustical Ceiling Products; 1998.

1.04 SUBMITTALS

A. See Section 01 3000 (01300) - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on suspension system components.

C. Samples: Submit two samples 6 x 6 inch in size illustrating material and finish of acoustical units.

D. Samples: Submit two samples each, 12 inches long, of suspension system main runner.

E. Manufacturer's Installation Instructions: Indicate special procedures.

1.05 QUALITY ASSURANCE

A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

1.07 PROJECT CONDITIONS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Install acoustical units after interior wet work is dry.

1.08 EXTRA MATERIALS

A. See Section 01 6000 (01600) - Product Requirements, for additional provisions.

B. Provide 5 percent of total acoustical unit area of each type of acoustical unit for Owner's use in maintenance of project.

PART 2 PRODUCTS

2.01 ACOUSTICAL UNITS

A. Manufacturers:
   1. USG Ceiling Systems: www.usg.com.
   2. Substitutions: See Section 01 6000 (01600) - Product Requirements.

B. Acoustical Units - General: ASTM E 1264, Class A.

C. Acoustical Panels Type **AT-1**: Vinyl faced gypsum board panels ASTM E 1264, Type XX pattern 6, with the following characteristics:
   1. Size: 24 x 24 inches.
   2. Thickness: 1/2 inches.
   3. Composition: Gypsum Core.
   4. Density: 2.0 lb/cu ft.
   5. Edge: Square Pattern..
   6. Surface Color: White.
   7. Surface Pattern: Smooth Vinyl.
   8. Product: 3260 Sheetrock Lay-In Ceiling Panel, Clima Plus.
   9. Suspension System: Exposed 15/16? White Grid.

2.02 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Perimeter Moldings: Same material and finish as grid.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C 636, ASTM E 580, and manufacturer's instructions and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Locate system on room axis according to reflected plan.

D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

E. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.

F. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

G. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

I. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

J. Do not eccentrically load system or induce rotation of runners.

K. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
   1. Use longest practical lengths.
   2. Overlap and rivet corners.

3.03 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install units after above-ceiling work is complete.

E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

F. Cutting Acoustical Units:
   1. Cut to fit irregular grid and perimeter edge trim.
   2. Make field cut edges of same profile as factory edges.
   3. Double cut and field paint exposed reveal edges.

3.04 ERECTION TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

SECTION 09 9000

PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints and stains.

C. See Schedule - Surfaces to be Finished, at end of this Section.

1.02 RELATED SECTIONS

A. Section 05 5000 (05500) - Metal Fabrications: Shop-primed items.

1.03 REFERENCES

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM D 16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2003.

1.04 DEFINITIONS

A. Conform to ASTM D 16 for interpretation of terms used in this section.

1.05 SUBMITTALS

A. See Section 01 3000 (01300) - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on all finishing products, including VOC content.

C. Samples: Submit two painted samples, illustrating selected colors and textures for each color and system selected with specified coats cascaded. Submit on tempered hardboard, 12 x 12 inch in size.

D. Certification: By manufacturer that all paints and coatings comply with VOC limits specified.

E. Certification: By manufacturer that all paints and coatings do not contain any of the prohibited chemicals specified; GreenSeal GS-11 certification is not required but if provided shall constitute acceptable certification.

F. Manufacturer's Instructions: Indicate special surface preparation procedures.

G. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years experience.

1.07 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame and smoke rating requirements for products and finishes.

1.08 DELIVERY, STORAGE, AND PROTECTION

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.09 ENVIRONMENTAL REQUIREMENTS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

C. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

D. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Paints:
   1. Base Manufacturer: Pratt and Lambert Paints.

B. Substitutions: See Section 01 6000 (01600) - Product Requirements.

2.02 PAINTS AND COATINGS - GENERAL

A. Paints and Coatings: Ready mixed, except field-catalyzed coatings. Prepare pigments:
   1. To a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.
   2. For good flow and brushing properties.
   3. Capable of drying or curing free of streaks or sags.

B. Volatile Organic Compound (VOC) Content:
   1. Provide coatings that comply with the most stringent requirements specified in the following:
      a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
   2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

C. Chemical Content: The following compounds are prohibited:
   1. Aromatic Compounds: In excess of 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
   2. Acrolein, acrylonitrile, antimony, benzene, butyl benzyl phthalate, cadmium, di (2-ethylhexyl) phthalate, di-n-butyl phthalate, di-n-octyl phthalate, 1,2-dichlorobenzene, diethyl phthalate, dimethyl phthalate, ethylbenzene, formaldehyde, hexavalent chromium, isophorone, lead, mercury, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, naphthalene, toluene (methylbenzene), 1,1,1-trichloroethane, vinyl chloride.

2.03 ACCESSORY MATERIALS

A. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified; commercial quality.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive Work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

3.02 PREPARATION

A. Surface Appurtenances: Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

B. Surfaces: Correct defects and clean surfaces which affect work of this section. Remove or repair existing coatings that exhibit surface defects.

C. Marks: Seal with shellac those which may bleed through surface finishes.

D. Impervious Surfaces: Remove mildew by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

E. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

F. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

G. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

H. Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.

I. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.

J. Interior Wood Items to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

K. Interior Wood Items to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

L. Seal wood door top and bottom edge surfaces with clear sealer.

M. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

C. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.

D. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

E. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

3.04 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.05 FIELD QUALITY CONTROL

A. See Section 01 4000 (01400) - Quality Requirements, for general requirements for field inspection.

B. Architect will provide field inspection.

3.06 CLEANING

A. Collect waste material which may constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.07 SCHEDULE - SURFACES TO BE FINISHED

A. Do Not Paint or Finish the Following Items:
   1. Items fully factory-finished unless specifically noted.
   2. Fire rating labels, equipment serial number and capacity labels.

B. Paint the surfaces described below under Schedule - Paint Systems.

C. Mechanical and Electrical: Use paint systems defined for the substrates to be finished.
   1. Paint all conduit and boxes occurring in finished areas to match background surfaces, unless otherwise indicated.
   2. Paint shop-primed items occurring in finished areas.
   3. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
   4. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
   5. Paint mechanical, electrical, and fire protection as noted on the drawings above the black out line. Take precautions to mask off any sensitive items that can not accept paint. Verify these items with General Contractor.

3.08 SCHEDULE - PAINT SYSTEMS

A. **Interior Paint Schedule**

1. Ferrous metal surfaces:
   a. Prime coat: Steeltech Universal Alkyd HP Primer
   b. First and second finish coats:
      1) Gloss finish: Techgard Maintenance Gloss Enamel S4500 Series.
2. Plywood, medium density fiberboard, and wood trim surfaces:
   a. Prime coat: Suprime Int. Latex Enamel Undercoater, Z1013.
   b. First and second finish coats:
      1) Pro-Hide Gold Int. Latex Semi-Gloss, Z8300 Series.
      2) or Pro-Hide Silver Int. Latex Semi-Gloss, Z8370 Series.
3. Galvanized or aluminum metal surfaces:
   a. Prime coat: Enducryl Acrylic Prime or Finish, Z190.
   b. First and second finish coats:
      1) Flat finish: Acrylic Flat Enamel.
4. Gypsum board surfaces:
   a. Prime coat: Suprime Int. Latex Wall Primer, Z1004.
   b. First and second finish coats (eggshell):
      1) Pro-Hide Gold Int. Latex Eggshell, Z8200 Series.
      2) or Pro-Hide Silver Int. Latex Eggshell, Z8270 Series.
   c. First and second finish coats (flat):
      1) Pro-Hide Gold Int. Latex Flat, Z8100 Series.
      2) or Pro-Hide Silver Int. Latex Flat, Z8170 Series.

   d. First and second coasts (projection screen).
      1) Goo Systems, Reference white, reflective base coat. 2 coats required.
      2) Goo Systems, Reference white, diffusive finish coat, 2 coats required.
      3) Contact Info: Goo Systems Global www.goosystemsglobal.com

B. Interior Stain Schedule

1. Wood panel and wood trim surfaces:
   a. First coat: Z197 Acrylic Latex Stain
   b. First and second finish coats:
      1) Acrylic Latex Varnish Satin.

3.09 SCHEDULE - COLORS

A. For color selections, see drawings.

END OF SECTION

SECTION 21 0500

COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of all Division-21 sections.

1.02 DESCRIPTION OF WORK

A. The base bid shall include furnishing all materials, labor, tools, equipment and installation of all work required to install complete fire protection systems as outlined in Division-21.

B. Unless specifically described otherwise, the contractor responsible for installing the work inside the building shall extend all fire suppression utilities from a point 5'-0" outside the building.

C. Examine the drawings, specifications, and visit the site prior to submitting a bid.

D. This Section includes the following:
1. Manufacturers
2. Product Delivery, Storage, and Handling
3. Substitutions and Equipment Selection
4. Firestopping and Smokestopping
5. Joining materials.
6. Dielectric fittings.
7. Sleeves.
8. Escutcheons.
9. Fastener systems.
10. Piping Systems – Common requirements.
11. Cleaning Premises
12. Painting

1.03 SUBMITTALS

A. General: Refer to Division 1 for general requirements concerning submittals.

B. Unless otherwise specified and in addition to provisions of the General Conditions, submit drawings having each sheet, and each page of a brochure, marked with identification and containing information described below. Submittals are to be complete, partial submittals will not be accepted.

C. Identification:
1. Include project name and Architect's job number. If pages are securely bound in brochure, this is needed on cover only.
2. Identification by specification section and article under which equipment or material is described, and by name, number and intended use as designated by contract drawings and specifications.
3. When more than one (1) item of equipment is covered by a single drawing or catalog cut, each project equipment item must be separately identified thereon with clear delineation as to which model or catalog number or performance data applied to each project item.

D. Information:
1. Include manufacturer's model number or catalog number, size and other data as requested.

2. Maintenance Manuals: Organize each maintenance manual with index and thumb-tab marker for each section of information; bind in 2" 3-ring, vinyl-covered binder, with pockets for folded sheets, properly labeled on spine and face of binder.

E. Welding certificates.

F. Record Drawings
1. Provide one set of As-Built Drawings and one copy of complete Electronic Drawing Files to the Owner at the date of final acceptance. Provide one set of As-Built Drawings to engineer at the date of final acceptance.

1.04 QUALITY ASSURANCE

A. General: Refer to Division 1 Sections for general administrative/procedural requirements related to compliance with codes and standards.

B. Application: It is a general requirement that mechanical work comply with applicable requirements and recommendations of standards published by listed agencies and trade associations, except to extent more detailed and stringent requirements are indicated or required by governing regulations.

C. Listing of Associations, Standards and Abbreviations Specific to Mechanical Work (in addition to standards specified in individual work sections), conform to following applicable standards:
1. AWS - American Welding Society, Inc.
2. AWWA - American Water Works Association, Inc.
3. EPA - Environmental Protection Agency
4. FM - Factory Mutual System
5. NIST - National Institute for Standards and Technology
6. NEC - National Electrical Code by NFPA
7. NFPA - National Fire Protection Association
8. OSHA - Occupational Safety and Health Administration (U.S. Department of Labor)
9. UL - Underwriter's Laboratories, Inc.

D. Supervision And Workmanship
1. Workmanship throughout shall conform to the standards of best practice and all labor employed must be competent to do all the work required.
2. Furnish the services of an experienced superintendent to be in constant charge of the work at all times.
3. Quality Assurances: If requested, provide documentation that confirms the ability to perform all work to be included under the contract. Assurance if requested, shall be in the form of a list of past projects of similar size and complexity and a list of six (6) references pertaining to those projects. Failure to demonstrate these quality assurances shall be taken as a statement of inability to perform.
4. A minimum of five (5) years experience in the installation of fire protection systems similar to the systems specified is required.
5. Core Drilling: Use core drills rather than percussion type equipment for making holes in concrete. All percussion type drilling including hammer drills must be scheduled through owner's representative.
6. Inspection: Provisions shall be made for owner's representative to make rough-in and open ceiling inspections prior to covering up work.

E. Specifications

1. Specifications shall be interpreted in connection with the drawings hereinbefore described, and if anything is shown on drawings and not mentioned in the

2. Furthermore, all materials and labor previously required to fully complete the work shall be included in the work even though each item necessarily involved be not specifically mentioned or shown. Such work and/or materials shall be of the same grade and quality as the parts actually specified and shown. Should there be a conflict between the plans and specifications, the greater quantity or better quality shall be furnished.

F. Phasing
1. General: Where the scope of work dictates that the project shall be constructed in phases, all costs shall be included for any temporary work required so that previous phases can be operational while construction is being done to adjacent spaces.

G. Plans
1. Plans are diagrammatic indicating required size, points of termination of piping and suggested routes. However, it is not intended that drawings indicate all necessary offsets. Install piping in such manner as to conform to the structure, avoid obstructions and preserve headroom.
2. Coordination Drawings: Provide coordination drawings and attend meetings as required to make sure all disciplines are coordinated and fit into specified spaces (i.e. ceilings, chases, and all others). The elevations of all disciplines shall be clearly marked throughout the drawings so that no interferences occur. Drawings shall depict actual clearances of installed equipment, penetration locations and service clearances. Indicate scheduling, sequencing, movement and positioning of large equipment during construction. Indicate where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the work. Conflicts in equipment and materials shall be corrected prior to installation.
3. All piping shall be run as straight as possible and symmetrical with architectural items.
4. Piping shall be concealed in pipe shafts, pipe spaces, and furring wherever possible.
5. Piping fabricated before coordination with the other trades will be done at one’s own risk.

H. Installer’s Qualifications: Firm with at least three (3) years of successful installation experience on projects with work similar to this project and meet applicable regulatory agencies requirements.

I. Compatibility: Provide products which are compatible with other products of the mechanical work, and with other work requiring interface with the mechanical work. Provide products with the proper and correct power characteristics, fuel-burning characteristics and similar adaptations for this project. Coordinate the selections from among options (if any) for compatibility of products.

J. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX.

K. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

L. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

M. Electrical Characteristics for Fire Protection Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.05 PERFORMANCE REQUIREMENTS

A. Examine all Mechanical, Electrical, Architectural, Site and Structural Drawings, and available soil reports. Visit site and become acquainted with all conditions which may affect execution of work.

B. Provide all work in accordance with State and Local Codes, Regulations and/or Ordinances, and meet approval of authorities having jurisdiction. Provide only new material and as specified.

C. Furnish to Owner, with a copy to the Owner a Certificate of Final Approval from governing authority prior to Owner's final acceptance, where applicable.

D. General Outline: The facilities and systems of the mechanical work include all Division 21 Sections.

E. Design supports for multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

F. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

G. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.06 COORDINATION OF FIRE PROTECTION WORK

A. Refer to Division 1 Sections for general coordination requirements applicable to entire work. The contract documents are diagrammatic in showing certain physical relationships which must be established within mechanical work, and in its interface with other work, including utilities, control and electrical work.

B. Arrange fire protection work in a neat, well organized manner, with piping and similar services running parallel with primary lines of the building.

C. Give right-of-way to piping which may slope for drainage.

D. Locate operating and control equipment properly to provide easy access, and arrange entire fire protection work with adequate access for operation and maintenance.

E. Advise other trades of openings required in their work for the subsequent move-in of large units of fire protection work (equipment).

1.07 PERMITS AND FEES

A. Permits and fees of every nature required in connection with this work shall be obtained and paid for by contractor, including installation fees and similar charges.

B. Laws and regulations which bear upon or affect the various branches of this work shall be complied with.

C. All work which laws require to be inspected shall be submitted to the proper public officials for inspections and certificates of final approval must be furnished to the Owner before final acceptance will be given by the Engineer.

1.08 WARRANTY

A. Provide a guarantee in written form stating that all work under this section shall be free of defective work, materials, and parts for a period of one year from the date of substantial completion owner's final acceptance and shall repair, revise or replace at no cost to the owner any such defects occurring within the guarantee period. State in written form that any items or occurrences arising during the guarantee period will be attended to in a timely manner and will in no case exceed four (4) working days from date of notification by owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Firms regularly engaged in the manufacture of products of quality, types and sizes required; and which have been in satisfactory use of not less than four (4) years in similar service, except as otherwise noted in specific sections of this division.

2.02 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect products against dirt, water, chemical and mechanical damage. Do not install damaged products.

B. Deliver products to site in factory fabricated containers, with the manufacturer’s label clearly visible. Handle carefully to avoid damage to components, enclosure and finish, and in strict accordance with manufacturer’s instructions.

C. Store products in clean dry place in original containers, protected from weather and construction traffic.

2.03 SUBSTITUTIONS AND EQUIPMENT SELECTION

A. Equipment provided different than the basis of design must be compatible with the facility and meet all requirements of the contract documents.

B. If any changes are required to the work scope, due to the selected equipment being different from the design basis equipment, include all costs borne by all disciplines and consultants as a result of that substitution.

2.04 FIRESTOPPING AND SMOKESTOPPING

A. Provide firestopping at pipe penetrations of fire-rated walls, floors and ceilings. Maintain integrity (rating) of such walls, floors and ceilings.

B. Provide smokestopping at pipe penetrations of non-fire-rated walls, floors, and ceilings.

C. Refer to fire safing requirements specified in Division 7.

D. All through penetrations shall be labeled on both sides of the wall to indicate the appropriate UL system number, product used, installation date, hour rating installer, location number and telephone contact for the corresponding manufacturer. Material installed shall be as required for installation conditions and to achieve the required fire resistance.

E. Use only firestop products that have been UL 1479, ASTM E-814, or UL2079 tested for specific fire rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire rating involved for each separate instance.

F. Keep areas of work accessible until inspection by applicable code authorities.

2.05 JOINING MATERIALS

A. Refer to individual Division 21 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.

C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

D. Welding Filler Metals: Comply with AWS D10.12.

E. Solvent Cements for Joining Plastic Piping:
   1. CPVC Piping: ASTM F 493.

2.06 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 300-psig minimum working pressure as required to suit system pressures.

E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

2.07 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

2.08 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

2.09 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
   1. Manufacturers:
      a. Hilti, Inc.
      b. ITW Ramset/Red Head.
      c. Masterset Fastening Systems, Inc.
      d. MKT Fastening, LLC.
      e. Powers Fasteners.

B. Mechanical-Expansion Anchors: Insert-wedge-type stainless steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
   1. Coordinate subparagraph and list below with Part 2 "Manufacturers" Article. Retain "Available" for nonproprietary and delete for semiproprietary specifications.
   2. Manufacturers:
      a. B-Line Systems, Inc.; a division of Cooper Industries.
      b. Empire Industries, Inc.
      c. Hilti, Inc.
      d. ITW Ramset/Red Head.
      e. MKT Fastening, LLC.
      f. Powers Fasteners.

PART 3 EXECUTION

3.01 FRAMING FOR OPENINGS

A. Where a pipe slot is indicated for a group of pipes passing through a wall, set a rectangular frame of structural angles, welded in the slot, at each side of wall. Close each side of opening with two (2) No. 16 USG galvanized steel plates cut to fit the pipes and/or pipe insulation closely, and fasten to angle frame. For slots in exterior walls, slip flanged ferrules of sheet metal on pipes when they are installed, with flanges inside the closure plates at exterior wall face, caulk ferrules and plates to make weathertight joint, and pack space between closure plates with rock wool or glass fiber. At slots in fire walls, pack as specified above, but omit ferrules and caulking. Escutcheons are by Division 21.

B. Pipe Sleeves:
   1. For pipes passing through brick or concrete walls, or concrete floor slabs, provide steel pipe sleeves, two (2) sizes larger than the pipe for which they are intended. Coordinate setting of sleeves as construction progresses. Set sleeves flush with finished line of walls and floors. Where smooth bores are provided for piping penetrations after the wall/slab has been poured, steel pipe sleeves are not required unless needed to maintain the integrity of the structure (Example: brick walls shall require sleeves).
   2. Caulk sleeves through foundation walls to make them watertight.

C. Firestopping:
   1. Provide firestopping at pipe and duct penetrations of fire-rated walls, floors and ceilings. Maintain integrity (rating) of such walls, floors and ceilings.
   2. Provide asbestos-free material complying with ASTM E 814. Use one of the following:
      a. Dow Corning, “Fire Stop System”
      b. ProSet Systems, Inc., “ System A, B and C” (as applicable)
      c. USG Interiors, Inc., Thermafiles Fire/Smoke Stop System

3.02 INSPECTION

A. Installer must examine areas and conditions under which products are to be installed. Notify architectural and construction team members, in writing, of conditions detrimental to proper completion of work. Starting of installation constitutes acceptance.

3.03 CUTTING AND PATCHING

A. Comply with General Conditions for cutting and patching of other work, to accommodate the installation of mechanical work. Except as individually authorized by the Architect, cutting and patching of mechanical work to accommodate the installation of other work is not permitted, other than necessary penetrations of mechanical sheet metal work for electrical conduit and similar purposes.

3.04 SYSTEM TESTS

A. Perform all system tests in the presence of an authorized representative of the Owner. Notify the Owner of all system's tests at least 48 hours in advance.

3.05 SYSTEM INSPECTION

A. All systems are to be inspected by authorized representative of the Owner before covering, enclosing or concealing of work. Notify Owner of all systems which are to be covered, enclosed or concealed at least 48 hours in advance.

3.06 MECHANICAL DEMOLITION

A. Refer to Division 1 Sections "Cutting and Patching" and "Selective Demolition" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove mechanical systems, equipment, and components indicated to be removed.
   1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
   2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
   3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
   4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
   5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.07 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 21 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install escutcheons for penetrations of walls, ceilings, and floors.

H. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

I. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials.

3.08 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 21 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

E. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.09 CLEANING PREMISES

A. During the progress of the work, clean up and leave the premises and all portions of the building in which work was performed in a clean and safe condition. Refer to Division 1.

3.10 PAINTING

A. Paint all exposed piping. Coordinate color with architect.

3.11 WORK IN EXISTING SPACES

A. General: Care shall be taken when working in existing spaces so as not to damage existing walls and ceilings where work is being performed.

B. Existing Ceilings: Where work is being performed above ceilings, and the architectural drawings do not indicate ceiling modifications are the responsibility of others, remove and replace existing ceilings where work is being performed. In those instances, costs for all repair and installation of new grid, ceiling panels, etc shall be included. Match existing finishes.

C. New Ceilings: Where existing sprinklers are to remain, and the architectural drawings indicate replacement of the ceilings, temporarily remove and reinstall sprinkler escutcheons, etc. as required to accommodate the ceiling removal.

D. Walls & Floors: Patch existing walls and floors and match existing finishes where work is being removed or installed and patching is being performed, unless noted otherwise on the architectural drawings.

3.12 ARCHITECTURAL COORDINATION ITEMS

A. Cut and drill all openings in walls and floors required for the installation. Secure approval of Engineer before cutting and drilling. Neatly patch all openings cut.

B. Cutting and patching to be held to a minimum. Coordinate locations of sleeves and openings before construction is started.

C. Patching through fire rated walls and enclosures shall not diminish the rating of that wall or enclosure. Patch shall be equal to rockwool, firestop, caulk or approved "rated" patch.

D. Caulk or fire safe between sleeves and pipes, see Division 7 for caulking and fire safing requirements and the floor plan and partition schedule for partition ratings.

E. Furnish all access panels required for proper servicing of equipment. Provide access panels for all concealed valves, controls, and sprinkler devices required by NFPA. Provide frame as required for finish. Exact locations to be approved by the Architect. Minimum size to be 12" x 12", units to be 16 gauge steel, locking device shall be screwdriver cam locks. Refer to Division 9 for access panel manufacturers and material requirements. Provide phenolic plate with ID of item behind access panel on the face of the door.

F. Install standard Schedule 40 black steel pipe sleeves two sizes larger than pipes passing through floors, walls or masonry construction.

G. Sleeves through walls to be cut flush with both faces.

H. Sleeves through floor to extend one inch above floor top elevation.

I. Caulk or fire safe between sleeves and pipes, see Division 7 for caulking and fire safing requirements and the floor plan partition schedule for partition ratings.

J. Install manufactured chromium plated escutcheon plates wherever uninsulated exposed pipes pass through walls, floors, or ceilings. Escutcheon inside diameter to closely fit around pipe and outside diameter to completely cover opening.

K. Furnish and set all forms required in masonry walls or foundation to accommodate pipes.

L. Provide flexible connectors where all pipes cross building expansion joints equal to Flexonics. Coordinate exact quantity & location with Architectural plans prior to installation of piping.

END OF SECTION

SECTION 21 0529

HANGERS AND SUPPORTS FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes the following:
   1. Steel pipe hangers and supports.
   2. Metal framing systems.
   3. Fastener systems.
   4. Equipment supports.

1.02 SUBMITTALS

A. Welding certificates.

1.03 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 PRODUCTS

2.01 STEEL PIPE HANGERS AND SUPPORTS

A. Vertical Piping: MSS Type 8 or Type 42, clamps.
   1. Support vertical piping and tubing at base and at each floor.

B. Individual, Straight, Horizontal Piping Runs: According to the following:
   1. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
      a. Anvil International, Clevis type, Figure 260. Provide copper coated hanger materials for those hangers in direct contact with copper pipe.
   2. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.

C. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.

D. Base of Vertical Piping: MSS Type 52, spring hangers.

E. Steel Piping:
   1. Install supports for vertical steel piping every 15 feet.
   2. Install hangers for non threaded lightwall steel piping with the following maximum horizontal spacing and minimum rod diameters:
      a. NPS 1-1/4 and Smaller: 12 feet with 3/8-inch rod.
      b. NPS 1-1/2 to NPS 4: 15 feet with 3/8-inch rod.
      c. NPS 5 to NPS 8: 15 feet with 1/2-inch rod.
      d. NPS 10 and larger: 15 feet with 5/8-inch rod.
   3. Install hangers for threaded lightwall steel piping with the following maximum horizontal spacing and minimum rod diameters:
      a. NPS 3 and Smaller: 12 feet with 3/8-inch rod.
      b. NPS 3-1/2 to NPS 4: 15 feet with 3/8-inch rod.
      c. NPS 5 to NPS 8: 15 feet with 1/2-inch rod.
   4. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

F. Copper Tubing:
   1. Install supports for vertical copper tubing every 10 feet.

2. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
    a. NPS 1 and Smaller: 8 feet with 3/8-inch rod.
    b. NPS 1-1/4 and NPS 1-1/2: 10 feet with 3/8-inch rod.
    c. NPS 2 to NPS 3: 12 inches with 3/8-inch rod.
    d. NPS 4: 15 feet with 3/8-inch rod.
    e. NPS 5 to NPS 8: 15 feet with 1/2-inch rod.
3. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

G. CPVC Piping:
1. Install supports for vertical CPVC piping every 4 feet.
2. Install hangers for CPVC piping with the following maximum horizontal spacing and minimum rod diameters:
    a. NPS 3/4: 5 feet 6 inches with 3/8-inch rod.
    b. NPS 1: 6 feet with 3/8-inch rod.
    c. NPS 1-1/4: 6 feet 6 inches with 3/8-inch rod.
    d. NPS 1-1/2: 7 feet with 3/8-inch rod.
    e. NPS 2: 8 feet with 3/8-inch rod.
    f. NPS 2-1/2: 9 feet with 3/8-inch rod
    g. NPS 3: 10 feet with 3/8-inch rod.
3. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

H. Manufacturers:
1. AAA Technology & Specialties Co., Inc.
2. Bergen-Power Pipe Supports.
3. B-Line Systems, Inc.; a division of Cooper Industries.
4. Carpenter & Paterson, Inc.
5. Empire Industries, Inc.
6. ERICO/Michigan Hanger Co.
7. Globe Pipe Hanger Products, Inc.
8. Anvil International
9. GS Metals Corp.
10. National Pipe Hanger Corporation.
11. PHD Manufacturing, Inc.
12. PHS Industries, Inc.
13. Piping Technology & Products, Inc.
14. Tolco Inc.

2.02 METAL FRAMING SYSTEMS

A. Manufacturers:
1. B-Line Systems, Inc.; a division of Cooper Industries.
2. ERICO/Michigan Hanger Co.; ERISTRUT Div.
3. GS Metals Corp.
4. Power-Strut Div.; Tyco International, Ltd.
5. Thomas & Betts Corporation.
6. Tolco Inc.
7. Unistrut Corp.; Tyco International, Ltd.

B. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.

C. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.03 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
   1. Manufacturers:
      a. Hilti, Inc.
      b. ITW Ramset/Red Head.
      c. Masterset Fastening Systems, Inc.
      d. MKT Fastening, LLC.
      e. Powers Fasteners.

B. Mechanical-Expansion Anchors: Insert-wedge-type stainless steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
   1. Manufacturers:
      a. B-Line Systems, Inc.; a division of Cooper Industries.
      b. Empire Industries, Inc.
      c. Hilti, Inc.
      d. ITW Ramset/Red Head.
      e. MKT Fastening, LLC.
      f. Powers Fasteners.

2.04 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

2.05 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
   1. Properties: Nonstaining, noncorrosive, and nongaseous.
   2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 EXECUTION

3.01 INSTALLATION OF HANGERS AND SUPPORTS

A. Suspended Equipment and Piping:
   1. Provide structural steel and steel rod hangers, rigid and workmanlike in appearance. Weld (with approval of Structural Engineer where attaching to building steel) structural steel hangers or bolt with hex head machine bolts and with spring lock washers under nuts.
   2. For suspension from concrete, provide steel or malleable iron inserts in poured concrete construction, as specified for pipe hangers and supports, and expansion shields, toggle bolts or lag screws, in other construction. Use electric drill with carbide bit for drilling concrete blocks.
   3. For suspension from structural steel, use beam or channel clamps with locking clips.
   4. Do not support mechanical components from ceiling grids or from suspension framing installed by other contractors.
   5. Do not suspend hangers from roof decks.
   6. Suspend from roof trusses and joists/joist girders only at panel points, at top cord only, unless otherwise indicated.
   7. Provide additional supports wherever needed, and structural steel members attached to building frame to provide additional points of support where required. Do

no drilling or building structural and miscellaneous steel, except as directed or indicated.

B. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

C. Install lateral bracing with pipe hangers and supports to prevent swaying.

D. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

E. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.

F. Hanger Rods and Hanger Spacing: All sections 6'-0" in length and longer are required to have at least 1 hanger minimum. Provide auxiliary angles spanning between *joints, as required. Comply with current A.S.M.E. code for pressure piping. Piping 5" size and larger to be supported by a minimum of two (2) joists, with pipe center between joists.

G. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

H. Insulated Pipe: Fit pipe hangers over outside diameter of insulation; provide sheet metal saddles 16 gage, 6" long by 1/3 of the circumference.

I. Supports are to be selected to support a weight of 5 times the water filled pipe plus 250 lbs.

END OF SECTION

SECTION 21 1313

WET PIPE SPRINKLER SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Provide a fire protection system throughout renovated areas, complete in all respects and in complete operating condition. Provide arm-overs from existing sprinklers and branch piping to sprinkler locations coordinated with the new ceiling plan and wall locations.

B. Include all design, hydraulic calculations, piping layout, drawings, details and other drawings necessary for fabrication and installation of the fire protection system, and all required changes and revisions thereof necessary to obtain approval from the agency of authority having jurisdiction.

C. No extra charges will be allowed for changes to drawings, piping, etc., required to conform to NFPA Standards, the Owner requirements, of the authority having jurisdiction, the Owner's underwriter and with conflict with other trades.

D. All sprinkler work shall be coordinated on the job site before any piping shall be installed.

1.02 SYSTEM DESCRIPTIONS

A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water fed from a dedicated sprinkler water supply. Water discharges immediately from each sprinkler when the sprinkler is exposed to higher temperatures than the sprinkler is rated for. Sprinklers open when heat melts fusible link or destroys frangible device.

1.03 SUBMITTALS

A. Shop Drawings: Refer to Division 1 for number of detailed shop drawings and hydraulic calculation submittals required. Provide submittals for all products listed in Part 2 and other related sprinkler sections, which includes hangers, ID tags, fire safing, support framing, compressors, spare parts boxes/tools, etc. Provide all data required by NFPA and the authorities having jurisdiction. Shop Drawings shall be submitted to the Engineer for review and approval, prior to submission to appropriate authority and prior to installation of any portion of both underground and overhead systems.
   1. Furnish all drawings accurately to scale on sheets of uniform size and include all necessary data, as required by NFPA.

B. Shop drawings for the following fire protection equipment and accessories shall be submitted:
   1. Piping
   2. Equipment
   3. Valves
   4. Sprinklers
   5. Flow Switches
   6. Valve Switches

C. Approval is required prior to beginning fabrication and installation. Final acceptance shall be based upon final inspection and tests and approval by the authority having jurisdiction.

D. Upon completion of the installation, correct all engineering tracings, if changes were made in the field, and submit to the Owner one (1) complete set of reproducible tracings.

E. Operation and maintenance data.

1.04 QUALITY ASSURANCE

A. License/registrations within the state and local jurisdiction where the work is being performed are required.

B. Materials, devices and equipment shall be new and listed by U.L. and approved by Factory Mutual (FM) for use in fire protection systems.

C. Codes and Standards:
   1. NFPA Compliance: Install fire protection systems in accordance with NFPA 13 "Standard for the Installation of Sprinkler Systems".
   2. FM Compliance: Provide fire protection products and installations in accordance with FM Standards; provide FM label on each product.
   3. UL Compliance: Provide fire protection products in accordance with UL Standards; provide UL label on each project.
   4. Owner's Insurance Agency Compliance: Provide fire protection products in accordance with the Owner's underwriter.

PART 2 PRODUCTS

2.01 PIPE, FITTINGS AND CONNECTIONS

A. Coordinate All Piping and Head Locations with all Trades: No monies will be paid to correct conflicts arising from lack of coordination.

B. Piping shall be U.L. listed and Factory Mutual approved.

C. All fittings used on these systems to be capable of withstanding test pressures. If approved for use, light wall pipe shall not be threaded.

D. Interior Piping:
   1. Black Steel Pipe:
      a. Pipe Weight: Schedule 40 for piping up to and including 2"
         1) Fittings: Class 125, cast-iron threaded.
      b. Pipe Weight: Schedule 10 for 2-1/2” and larger
         1) Fittings: Mechanical grooved pipe couplings and fittings; roll groove type.

E. Auxiliary drains shall be installed where needed to remove water from low points in piping.

F. Where concealing sprinkler piping in finished areas is not possible, paint all exposed sprinkler piping in finished spaces. Obtain approval and coordinate color with architect.

2.02 SPRINKLERS

A. All sprinklers shall be U.L. listed and Factory Mutual approved.

B. In rooms where some existing sprinklers are to remain and new sprinklers are being added, new sprinklers shall match existing.

C. Sprinklers in exhibit spaces shall be custom painted in the factory. Coordinate color with the architect. Where possible, use full concealed sprinklers with custom painted cover plates.

D. Sprinkler escutcheon plates and recessed fittings shall be part of a listed and approved sprinkler assembly.

E. Provide custom painted brass sprinkler heads in unfinished areas, above ceilings when required. These heads shall not be subjected to obstructions of water flow discharge due to roof supporting structure.

2.03 MANUFACTURERS

A. Sprinklers:
   1. Tyco Fire Products
   2. Badger Fire Protection, Inc.
   3. Central Sprinkler Corp.
   4. Firematic Sprinkler Devices, Inc.
   5. Grinnell Corp.
   6. Reliable Automatic Sprinkler Co., Inc.
   7. Star Sprinkler Corp.
   8. Viking Corp.
   9. Victaulic Co. of America.

PART 3 EXECUTION

3.01 INSTALLATION

A. Furnish all labor, equipment, and conduct all required tests in the presence of and to the satisfaction of local authorities having jurisdiction, the Owner and the representative of the underwriters.

B. Sprinklers shall be aligned and installed in straight lines in both directions in coordination with lighting and air conditioning ceiling fixtures, and with the grid ceiling where they occur, subject to approval by Architect or Engineer before installation.

C. All horizontal runs for mains and branches shall be installed as close as practical to the bottom cord of roof joists taking into account allowance for system piping drainage.

3.02 CUTTING AND PATCHING:

A. Except as specified otherwise in this section, perform all cutting and patching and provide all openings together with lintel and supports which may be required for installation of work under this section including floors and walls. Patching shall be of the same materials, workmanship and finish as, and shall accurately match, all surrounding construction. All cutting and patching shall be done when so required by mechanics that did original work.

3.03 TESTS:

A. Upon completion of work, entire system shall be tested as specified in NFPA Standard No. 13.

B. Perform all tests in such a manner as to prevent water damage and staining of building and property.

C. Test all piping and devices comprising the fire protection system under hydrostatic pressure of not less than 200 psi for not less than two (2) hours. Furnish all water for tests. Repair any leaks and cracks developing as a result of these tests to the satisfaction of the Owner.

D. Conduct all tests in the presence of, and to the satisfaction of, local authorities having jurisdiction and the Owner, each of who is to be notified three (3) days in advance of any such test.

E. Upon completion of tests and when satisfactory results have been obtained, submit a signed and dated Material and Test Certificate for each system to Owner.

3.04 COMPLETION:

A. Remove all debris, materials and equipment from the premises upon completion of this work. Piping to be cleaned, ready for painting. Repair any areas damaged and stained as a result of the testing.

B. Provide the owner with one complete set of final as-built layout drawings.

C. Provide all operations and maintenance literature and instructions provided by the manufacturer for installed equipment.

D. Provide all literature and instructions provided by the manufacturer describing proper operation and maintenance of all installed equipment and devices.

END OF SECTION

SECTION 22 0500

COMMON WORK RESULTS FOR PLUMBING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Special Conditions and Division-1 Specification sections, apply to work of all Division-22 sections.

1.02 DESCRIPTION OF WORK

A. The base bid shall include furnishing all materials, labor, tools, equipment and installation of all work required to install complete plumbing systems as outlined in Division-22.

B. Unless specifically described otherwise, the contractor responsible for installing the work inside the building shall extend all plumbing utilities from a point 5'-0" outside the building.

C. Examine the drawings, specifications, and visit the site prior to submitting bid.

1.03 SUMMARY

A. This Section includes the following:
1. Manufacturers.
2. Product Delivery, Storage, and Handling.
3. Substitutions and Equipment Selection.
4. Firestopping and Smokestopping.
5. Dielectric fittings.
6. Sleeves.
7. Escutcheons.
8. Fastener systems.
9. Piping Systems – Common requirements.
10. Cleaning Premises

1.04 SUBMITTALS

A. General: Refer to Division 1 for general requirements concerning submittals.

B. Unless otherwise specified and in addition to provisions of the General Conditions, submit drawings having each sheet, and each page of a brochure, marked with identification and containing information described below. Submittals are to be complete, partial submittals will not be accepted.

C. Identification:
1. Include project name and Architect's job number. If pages are securely bound in brochure, this is needed on cover only.
2. Identification by specification section and article under which equipment or material is described, and by name, number and intended use as designated by contract drawings and specifications.
3. When more than one (1) item of equipment is covered by a single drawing or catalog cut, each project equipment item must be separately identified thereon with clear delineation as to which model or catalog number or performance data applied to each project item.

D. Information:
1. Include manufacturer's model number or catalog number, size and other data as requested.

2. Maintenance Manuals: Organize each maintenance manual with index and thumb-tab marker for each section of information; bind in 2" 3-ring, vinyl-covered binder, with pockets for folded sheets, properly labeled on spine and face of binder.

E. Welding certificates.

F. Record Drawings
1. Provide one set of As-Built Drawings and one copy of complete Electronic Drawing Files to the Owner at the date of final acceptance. Provide one set of As-Built Drawings to engineer at the date of final acceptance.

1.05 QUALITY ASSURANCE

A. General: Refer to Division 1 Sections for general administrative/procedural requirements related to compliance with codes and standards.

B. Application: It is a general requirement that mechanical work comply with applicable requirements and recommendations of standards published by listed agencies and trade associations, except to extent more detailed and stringent requirements are indicated or required by governing regulations.

C. Listing of Associations, Standards and Abbreviations Specific to Mechanical Work (in addition to standards specified in individual work sections), conform to following applicable standards:
1. ASME - American Society of Mechanical Engineers
2. ASPE - American Society of Plumbing Engineers
3. ASSE - American Society of Sanitary Engineering
4. AWS - American Welding Society, Inc.
5. AAGI - Compressed Air and Gas Institute
6. NEC - National Electrical Code by NFPA
7. NFPA - National Fire Protection Association
8. OSHA - Occupational Safety and Health Administration (U.S. Department of Labor)
9. UL - Underwriter's Laboratories, Inc.

D. Supervision And Workmanship
1. Workmanship throughout shall conform to the standards of best practice and all labor employed must be competent to do all the work required.
2. Furnish the services of an experienced superintendent to be in constant charge of the work at all times.
3. Quality Assurances: If requested demonstrate the ability to perform all work to be included under the contract. Assurance if requested, shall be in the form of a list of past projects of similar size and complexity and a list of six (6) references pertaining to those projects. Failure to demonstrate these quality assurances shall be taken as a statement of inability to perform.
4. A minimum five (5) years experience in the installation of plumbing systems similar to the systems specified is required.
5. Core Drilling: Use core drills rather than percussion type equipment for making holes in concrete. All percussion type drilling including hammer drills must be scheduled through owner's representative.
6. Inspection: Provisions shall be made for owner's representative to make rough-in and open ceiling inspections prior to covering up work.

E. Specifications
1. Specifications shall be interpreted in connection with the drawings hereinbefore described, and if anything is shown on drawings and not mentioned in the specifications, or vice versa, it is to be included in the work the same as though clearly set forth by both.

2. Furthermore, all materials or labor previously required to fully complete the work shall be included even though each item necessarily involved be not specifically mentioned or shown. Such work and/or materials shall be of the same grade or quality as the parts actually specified and shown. Should there be a conflict between the plans and specifications, the greater quantity or better quality shall be furnished.

F. Phasing
1. General: Where the scope of work dictates that the project shall be constructed in phases, all costs shall be incurred for any temporary work required so that previous phases can be operational while construction is being done to adjacent spaces.

G. Plans
1. Plans are diagrammatic indicating required size, points of termination of piping and suggested routes. However, it is not intended that drawings indicate all necessary offsets. Install piping in such manner as to conform to the structure, avoid obstructions and preserve headroom.
2. Coordination Drawings: Provide coordination drawings and attend meetings as required to make sure all disciplines are coordinated and fit into specified spaces (i.e. ceilings, chases, and all others). The elevations of all disciplines shall be clearly marked throughout the drawings so that no interferences occur. Drawings shall depict actual clearances of installed equipment, penetration locations and service clearances. Indicate scheduling, sequencing, movement and positioning of large equipment during construction. Indicate where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the work. Conflicts in equipment and materials shall be corrected prior to installation.
3. All piping shall be run as straight as possible and symmetrical with architectural items.
4. Piping shall be concealed in pipe shafts, pipe spaces, and furring wherever possible.
5. Piping fabricated before coordination with the other trades will be done at one’s own risk.

H. Installer’s Qualifications: Firm with at least five (5) years of successful installation experience on projects with work similar to this project and meet applicable regulatory agencies requirements.

I. Compatibility: Provide products which are compatible with other products of the mechanical work, and with other work requiring interface with the mechanical work. Provide products with the proper or correct power characteristics, fuel-burning characteristics and similar adaptations for this project. Coordinate the selections from among options (if any) for compatibility of products.

J. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX.

K. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

L. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

M. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and

connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.06 PERFORMANCE REQUIREMENTS

A. Examine all Mechanical, Electrical, Architectural, Site and Structural Drawings, and available soil reports. Visit site and become acquainted with all conditions which may affect execution of work.

B. Provide all work in accordance with State and Local Codes, Regulations and/or Ordinances, and meet approval of authorities having jurisdiction. Provide only new material and as specified.

C. Furnish to Owner, with a copy to the Owner a Certificate of Final Approval from governing authority prior to Owner's final acceptance, where applicable.

D. General Outline: The facilities and systems of the mechanical work include all Division 22 Sections.

E. Design supports for multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

F. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.07 COORDINATION OF PLUMBING WORK

A. Refer to Division 1 Sections for general coordination requirements applicable to entire work. The contract documents are diagrammatic in showing certain physical relationships which must be established within mechanical work, and in its interface with other work, including utilities, control and electrical work.

B. Arrange plumbing work in a neat, well organized manner, with piping and similar services running parallel with primary lines of the building.

C. Give right-of-way to piping which may slope for drainage.

D. Locate operating and control equipment properly to provide easy access, and arrange entire plumbing work with adequate access for operation and maintenance.

E. Advise other trades of openings required in their work for the subsequent move-in of large units of plumbing work (equipment).

F. Strictly adhere to invert elevations for all underground piping. Pitch piping evenly between pipe junctions and where indicated on the drawings. Piping, not installed at invert elevations indicated on the drawings, shall be removed and re-laid.

1.08 PERMITS AND FEES

A. Permits and fees of every nature required in connection with this work shall be obtained and paid for by the contractor, including all the installation fees and similar charges.

B. Laws and regulations which bear upon or affect the various branches of this work shall be complied with, and are hereby made a part of this contract.

C. All work which laws require to be inspected shall be submitted to the proper public officials for inspections and certificates of final approval must be furnished to the Owner before final acceptance will be given by the Engineer.

1.09 WARRANTY

A. Provide a guarantee in written form stating that all work under this section shall be free of defective work, materials, or parts for a period of one year from the date of substantial

completion owner's final acceptance and shall repair, revise or replace at no cost to the owner any such defects occurring within the guarantee period. State in written form that any items or occurrences arising during the guarantee period will be attended to in a timely manner and will in no case exceed four (4) working days from date of notification by owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Firms regularly engaged in the manufacture of products of quality, types and sizes required; and which have been in satisfactory use of not less than four (4) years in similar service, except as otherwise noted in specific sections of this division.

2.02 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect products against dirt, water, chemical and mechanical damage. Do not install damaged products.

B. Deliver products to site in factory fabricated containers, with the manufacturer's label clearly visible. Handle carefully to avoid damage to components, enclosure and finish, and in strict accordance with manufacturer's instructions.

C. Store products in clean dry place in original containers, protected from weather and construction traffic. If the new structure is not weathered in, the contractor will provide portable storage trailers to protect material that can be damaged by the weather.

D. The contractor shall be responsible for all security related to theft and vandalism for stored materials. Failure to adequately protect equipment that is damaged will not be cause for delay claims.

2.03 SUBSTITUTIONS AND EQUIPMENT SELECTION

A. Equipment provided different than the basis of design must be compatible with the facility and meet all requirements of the contract documents.

B. If any changes are required to the work scope, due to the selected equipment being different from the design basis equipment, include all costs borne by all disciplines and consultants as a result of that substitution.

2.04 FIRESTOPPING AND SMOKESTOPPING

A. Provide firestopping at pipe penetrations of fire-rated walls, floors and ceilings. Maintain integrity (rating) of such walls, floors and ceilings.

B. Provide smokestopping at pipe penetrations of non-fire-rated walls, floors, and ceilings.

C. Refer to fire safing requirements specified in Division 7.

D. All through penetrations shall be labeled on both sides of the wall to indicate the appropriate UL system number, product used, installation date, hour rating installer, location number and telephone contact for the corresponding manufacturer. Material installed shall be as required for installation conditions and to achieve the required fire resistance.

E. Use only firestop products that have been UL 1479, ASTM E-814, or UL2079 tested for specific fire rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire rating involved for each separate instance.

F. Keep areas of work accessible until inspection by applicable code authorities.

2.05 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 300-psig minimum working pressure as required to suit system pressures.

E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

2.06 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

2.07 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Type: With set screw.
   1. Finish: Polished chrome-plated.

D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
   1. Finish: Polished chrome-plated.

2.08 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
   1. Manufacturers:
      a. Hilti, Inc.
      b. ITW Ramset/Red Head.
      c. Masterset Fastening Systems, Inc.
      d. MKT Fastening, LLC.
      e. Powers Fasteners.

B. Mechanical-Expansion Anchors: Insert-wedge-type stainless steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
   1. Manufacturers:
      a. B-Line Systems, Inc.; a division of Cooper Industries.
      b. Empire Industries, Inc.
      c. Hilti, Inc.
      d. ITW Ramset/Red Head.
      e. MKT Fastening, LLC.

f. Powers Fasteners.

2.09 PIPING EXPANSION JOINTS AND FLEXIBLE CONNECTORS

A. Products manufactured, tested, and approved by the manufacturer's of the piping material provided shall be approved.

B. Provide flexible connectors where all pipes cross building expansion joints. Refer to architectural drawings for locations of all expansion joints.

C. Manufacturers:
1. Flexonics
2. Stenflex
3. Flexicraft
4. Econfex
5. Unaflex
6. Hyspan

PART 3 EXECUTION

3.01 FRAMING FOR OPENINGS

A. Where a pipe slot is indicated for a group of pipes passing through a wall, set a rectangular frame of structural angles, welded in the slot, at each side of wall. Close each side of opening with two (2) No. 16 USG galvanized steel plates cut to fit the pipes and/or pipe insulation closely, and fasten to angle frame. For slots in exterior walls, slip flanged ferrules of sheet metal on pipes when they are installed, with flanges inside the closure plates at exterior wall face, caulk ferrules and plates to make weathertight joint, and pack space between closure plates with rock wool or glass fiber. At slots in fire walls, pack as specified above, but omit ferrules and caulking. Escutcheons are by Division 22.

B. Pipe Sleeves:
1. For pipes passing through brick or concrete walls, or concrete floor slabs, provide steel pipe sleeves, two (2) sizes larger than the pipe for which they are intended. Coordinate setting of sleeves as construction progresses. Set sleeves flush with finished line of walls and floors. Where smooth bores are provided for piping penetrations after the wall/slab has been poured, steel pipe sleeves are not required unless needed to maintain the integrity of the structure (Example: brick walls shall require sleeves).
2. Caulk sleeves through foundation walls to make them watertight.

C. Firestopping/Smokestopping
1. Provide firestopping/smokestopping at pipe penetrations of walls, floors and ceilings. Maintain integrity (rating) of such walls, floors and ceilings.
2. Refer to Division 7 for installation requirements.

3.02 INSPECTION

A. Installer must examine areas and conditions under which products are to be installed. Notify the architect and construction team, in writing, of conditions detrimental to proper completion of work. Starting of installation constitutes acceptance.

3.03 CUTTING AND PATCHING

A. Comply with General Conditions for cutting and patching of other work, to accommodate the installation of mechanical work. Except as individually authorized by the Architect, cutting and patching of mechanical work to accommodate the installation of other work is not permitted, other than necessary penetrations of mechanical sheet metal work for electrical conduit and similar purposes.

3.04 SYSTEM TESTS

A. Perform all system tests in the presence of an authorized representative of the Owner. Notify the Owner of all system's tests at least 48 hours in advance.

B. Provide written documentation for each test completed that lists the item or system tested with all test criteria

3.05 SYSTEM INSPECTION

A. All systems are to be inspected by authorized representative of the Owner before covering, enclosing or concealing of work. Notify Owner of all systems which are to be covered, enclosed or concealed at least 48 hours in advance.

3.06 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping free of sags and bends.

H. Install escutcheons for penetrations of walls, ceilings, and floors.

I. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

J. Fire and Smoke-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop/smokestop materials.

K. Verify final equipment locations for roughing-in.

L. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.07 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

F. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

3.08 CLEANING PREMISES

A. During the progress of the work, clean up portions of the building in which work was performed in a clean and safe condition. Refer to Division 1.

3.09 PAINTING

A. Paint all exposed piping. Coordinate color with architect.

3.10 WORK IN EXISTING SPACES

A. General: Care shall be taken when working in existing spaces so as not to damage existing walls and ceilings where work is being performed.

B. Existing Ceilings: Where work is being performed above ceilings, and the architectural drawings do not indicate ceiling modifications, remove and replace existing ceilings where work is being performed. In those instances, repair and install new grid, ceiling panels, etc. Match existing finishes.

C. Walls & Floors: Patch existing walls and floors and match existing finishes where work is being removed or installed and patching is being performed, unless noted otherwise on the architectural drawings.

3.11 ARCHITECTURAL COORDINATION ITEMS

A. Cut and drill all openings in walls and floors required for the installation. Secure approval of Engineer before cutting and drilling. Neatly patch all openings cut.

B. Cutting and patching to be held to a minimum. Arrange for all sleeves and openings before construction is started.

C. Patching through fire rated walls and enclosures shall not diminish the rating of that wall or enclosure. Patch shall be equal to rockwool, firestop, caulk or approved "rated" patch.

D. Caulk or fire safe between sleeves and pipes, see Division 7 for caulking and fire safing requirements and the floor plan and partition schedule for partition ratings.

E. Furnish all access panels required for proper servicing of equipment. Provide access panels for all concealed valves. Provide frame as required for finish. Exact locations to be approved by the Architect. Minimum size to be 12" x 12", units to be 16 gauge steel, locking device shall be screwdriver cam locks. Refer to Division 9 for access panel manufacturers and material requirements. Provide phenolic plate with ID of item behind access panel on the face of the door.

F. Install standard Schedule 40 black steel pipe sleeves two sizes larger than pipes passing through floors, walls or masonry construction.

G. Sleeves through walls to be cut flush with both faces.

H. Sleeves through floor to extend one inch above floor top elevation.

I. Caulk or fire safe between sleeves and pipes, see Division 7 for caulking and fire safing requirements and the floor plan partition schedule for partition ratings.

J. Install manufactured chromium plated escutcheon plates wherever uninsulated exposed pipes pass through walls, floors, or ceilings. Escutcheon inside diameter to closely fit around pipe and outside diameter to completely cover opening.

K. Furnish and set all forms required in masonry walls or foundation to accommodate pipes.

END OF SECTION

SECTION 22 0529

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes the following:
   1. Steel pipe hangers and supports.
   2. Metal framing systems.
   3. Fastener systems.
   4. Equipment supports.

1.02 SUBMITTALS

A. Welding certificates.

1.03 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 PRODUCTS

2.01 STEEL PIPE HANGERS AND SUPPORTS

A. Vertical Piping: MSS Type 8 or Type 42, clamps.
   1. Support vertical piping and tubing at base and at each floor.

B. Individual, Straight, Horizontal Piping Runs: According to the following:
   1. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
      a. Clevis type: Provide copper coated hanger materials for those hangers in direct contact with copper pipe.
   2. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.

C. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.

D. Base of Vertical Piping: MSS Type 52, spring hangers.

E. Cast-iron Piping:
   1. Install supports for vertical cast-iron soil piping every 15 feet.
   2. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
      a. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
      b. NPS 3: 60 inches with 1/2-inch rod.
      c. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
      d. NPS 6 : 60 inches with 3/4-inch rod.
      e. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.
   3. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

F. Steel Piping:
   1. Install supports for vertical steel piping every 15 feet.
   2. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
      a. NPS 1-1/4 and Smaller: 84 inches with 3/8-inch rod.

b. NPS 1-1/2: 108 inches with 3/8-inch rod.
c. NPS 2: 10 feet with 3/8-inch rod.
d. NPS 2-1/2: 11 feet with 1/2-inch rod.
e. NPS 3 and NPS 3-1/2: 12 feet with 1/2-inch rod.
f. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
g. NPS 6: 12 feet with 3/4-inch rod.

3. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

G. Copper Tubing:
1. Install supports for vertical copper tubing every 10 feet.
2. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
a. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
b. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
c. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
d. NPS 2-1/2: 108 inches with 1/2-inch rod.
e. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
f. NPS 6: 10 feet with 5/8-inch rod.
3. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

H. PVC Piping:
1. Install supports for vertical PVC piping every 4 feet.
2. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:
a. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
b. NPS 3: 48 inches with 1/2-inch rod.
c. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
d. NPS 6: 48 inches with 3/4-inch rod.
3. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

I. Manufacturers:
1. AAA Technology & Specialties Co., Inc.
2. Bergen-Power Pipe Supports.
3. B-Line Systems, Inc.; a division of Cooper Industries.
4. Carpenter & Paterson, Inc.
5. Empire Industries, Inc.
6. ERICO/Michigan Hanger Co.
7. Globe Pipe Hanger Products, Inc.
8. Anvil International
9. GS Metals Corp.
10. National Pipe Hanger Corporation.
11. PHD Manufacturing, Inc.
12. PHS Industries, Inc.
13. Piping Technology & Products, Inc.
14. Tolco Inc.

2.02 METAL FRAMING SYSTEMS

A. Manufacturers:
1. B-Line Systems, Inc.; a division of Cooper Industries.
2. ERICO/Michigan Hanger Co.; ERISTRUT Div.
3. GS Metals Corp.
4. Power-Strut Div.; Tyco International, Ltd.
5. Thomas & Betts Corporation.
6. Tolco Inc.

7. Unistrut Corp.; Tyco International, Ltd.

B. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.

C. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.03 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
   1. Manufacturers:
      a. Hilti, Inc.
      b. ITW Ramset/Red Head.
      c. Masterset Fastening Systems, Inc.
      d. MKT Fastening, LLC.
      e. Powers Fasteners.

B. Mechanical-Expansion Anchors: Insert-wedge-type stainless steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
   1. Manufacturers:
      a. B-Line Systems, Inc.; a division of Cooper Industries.
      b. Empire Industries, Inc.
      c. Hilti, Inc.
      d. ITW Ramset/Red Head.
      e. MKT Fastening, LLC.
      f. Powers Fasteners.

2.04 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

2.05 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
   1. Properties: Nonstaining, noncorrosive, and nongaseous.
   2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 EXECUTION

3.01 INSTALLATION OF HANGERS AND SUPPORTS

A. Suspended Equipment and Piping:
   1. Provide structural steel and steel rod hangers, rigid and workmanlike in appearance. Weld (with approval of Structural Engineer where attaching to building steel) structural steel hangers or bolt with hex head machine bolts and with spring lock washers under nuts.
   2. For suspension from concrete, provide steel or malleable iron inserts in poured concrete construction, as specified for pipe hangers and supports, and expansion shields, toggle bolts or lag screws, in other construction. Use electric drill with carbide bit for drilling concrete blocks.
   3. For suspension from structural steel, use beam or channel clamps with locking clips.
   4. Do not support mechanical components from ceiling grids.
   5. Do not suspend hangers from roof decks.

6. Suspend from roof trusses and joists/joist girders only at panel points, at top cord only, unless otherwise indicated.
7. Provide additional supports wherever needed, and structural steel members attached to building frame to provide additional points of support where required. Do no drilling or building structural and miscellaneous steel, except as directed or indicated.

B. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

C. Install lateral bracing with pipe hangers and supports to prevent swaying.

D. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

E. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.

F. Hanger Rods and Hanger Spacing: 6'-0" spacing maximum, provide auxiliary angles spanning between *joints, as required. Comply with current A.S.M.E. code for pressure piping. Piping 5" size and larger to be supported by a minimum of two (2) joists, with pipe center between joists.

G. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

H. Insulated Pipe: Fit pipe hangers over outside diameter of insulation; provide sheet metal saddles 16 gage, 6" long by 1/3 of the circumference.

END OF SECTION

SECTION 22 1500

GENERAL SERVICE COMPRESSED AIR SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Provide all compressed air materials for, or incidental to, installation of complete compressed air system, as required by drawings and these specifications. Section includes, but is not necessarily limited to:
   1. Air compressor package (compressor, filters, and air dryer)
   2. Piping systems from air compressor to animatronics requiring compressed air.
   3. Flushing, Cleaning and Disinfecting
   4. Testing

1.02 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Field quality-control test reports.

C. Operation and maintenance data.

1.03 QUALITY ASSURANCE

A. Applicable codes and standards.

PART 2 PRODUCTS

2.01 AIR COMPRESSOR

A. Ingersoll-Rand Two Stage Reciprocating Air Compressor
   1. Model: 2475N7.5-3P
   2. Electrics: 208/3/60
   3. Include compressor, 7.5hp motor, 80 gallon vertical tank, with a starter mounted and wired

B. Ingersoll-Rand Refrigerated Air Dryer
   1. Model: D54IN

C. Coalescing Filter
   1. Model: F71iH

D. General Purpose Filter
   1. Model: F71IG

E. PolySep Oil/Water Separator
   1. Model: PS-7

F. Regulator
   1. Model: R37461-100

2.02 COMPRESSED AIR PIPING

A. Interior Air Piping:
   1. Black iron steel pipe.
      a. Pipe weight: Schedule 40.
      b. Fittings: Class 125 cast-iron threaded.

2.03 VALVES

A. Ball
   1. All valves installed in compressed air piping shall be ball valves.

2. Ball Valves - 2-piece body, 600 psi CWP, 150 psi SWP, Cast Bronze body, full port, teflon seats, blowout-proof stem, adjustable packing gland, chrome plated bronze ball, with screwed ends, and vinyl-covered steel handle. Provide solder ends for domestic hot and cold water service; threaded ends for heating hot water condenser water, chilled water and low pressure steam. Provide extended valve stems for valves used on insulated lines. Provide equal to Nibco Series 585-70-NS.

B. Manufacturers
1. Nibco
2. Milwaukee
3. Watts
4. Apollo

PART 3 EXECUTION

3.01 GENERAL

A. Appropriate compression shutoff valve and ground joint unions shall be used at each fixture and piece of equipment to facilitate removal of equipment.

B. Adapters used for screwed valves and any connection to steel shall be insulated to prevent electrolysis.

C. Use dielectric unions where dissimilar metals are joined together.

3.02 INSTALLATION

A. Locate group of pipes parallel to each other, spaced to permit servicing of valves. Branch takeoffs shall be off of the top of the main, main shall be sloped back towards compressor or shall be provided with a drip leg and clean out.

B. Shutoff Valves: Install on inlet of each mechanical equipment item and hose outlet.

C. Outlets unless otherwise noted, shall be turn down the wall to 3' above floor finish. Provide terminal with valve and quick connect fitting. Coordinate fitting with owner.

3.03 TESTING

A. Provide temporary equipment for testing, including pump and gages. Subject entire piping systems to leak tests, either as a whole, or in sections; but leave no part untested.

B. Fill piping systems with air, and pressurize at 150% of operating pressure, (but not less than 150 psi) for 2 hours. Test fails if leakage is observed, or pressure drop exceeds 5% of test pressure.

C. Notify Architect/Engineer at least 24 hours before performing leak test.

D. Repair piping systems which fail required piping test, by disassembly and re-installation, using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.

3.04 FLUSHING AND CLEANING

A. Clean and flush system of all dirt, metal chips, sand, and foreign matter. After flushing remove, clean, and replace all strainer baskets or screens. Inspect each run of each system for completion of joints, supports, accessory items, and obvious leaks.

3.05 PIPING INSTALLATION

A. Basic piping installation requirements are specified in Division 22 Section "Common Work Results for Plumbing."

3.06 CONNECTIONS

A. Connect piping system to animatronics per manufacturer's instructions. Install shutoff valve at each unit.

END OF SECTION

SECTION 26 0001

GENERAL ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplemental Conditions and Division-1 Specification sections, apply to work of Division 26 sections.

B. E-series drawings apply to work of Division 26 sections and vice versa.

1.02 ELECTRONIC FILES

A. Drawings for this project were prepared using AutoCAD software. Electronic files are available upon request for use by the successful contractor(s) for planning, coordination and installation.

B. There will be no charge for drawing files that were prepared using AutoCAD. These files will be available in the version in which they were created.

C. The Request Drawings form can be accessed, filled out and submitted at the following internet address (scroll down to bottom of home page): http://www.klhengrs.com.

1.03 SPECIAL CONDITIONS

A. Owner's representative or engineer may relocate fixture, device or equipment outlets prior to installation within a 15 foot limit at no additional charge. This would not include floor receptacles.

B. Complete work, or part(s) thereof, at such time as may be designated by the owner's representative, so that it can be used for temporary or permanent use. Do not construe such use of the system as an acceptance of same by Owner.

1.04 GENERAL STANDARDS

A. Provide work in compliance with applicable provisions of the following standards. Provide UL listing and UL label for electrical materials, equipment luminaires, devices, etc.

B. Provide work in strict accordance with the latest edition of applicable codes including (but not limited to) the following codes and standards.
1. National Electrical Code (NEC), NFPA 70.
2. Life Safety Code, NFPA 101.
3. Other Provisions of NFPA as applicable.
4. Local Electrical Codes.
5. Local utility company requirements.
6. ADA/ADAAG requirements.
7. ASME.
8. International Building Code.
9. West Virginia Building Code.

1.05 PERMITS AND REGULATIONS

A. Provide electrical materials, installation methods, workmanship, testing, etc., unless otherwise specified, that conforms with the latest rules, regulations and specifications of the National Electrical Code, the National Board of Fire Underwriters, local and state codes having jurisdiction and applicable utility companies.

B. If a discrepancy between Division 26 drawings and specifications and codes, laws, ordinances, rules and regulations is discovered, immediately notify the engineer and proceed no further with related work until response is received.

C. Obtain and pay for permits, certificates of inspection and approval, etc. required for this branch of the work.

D. Furnish Owner with certificates of final inspection and approval prior to final acceptance of this branch of the work.

1.06 SPECIFICATIONS AND TERMINOLOGY

A. Wherever the term "furnish" appears in documents, interpret to mean "supply and deliver to project site, ready for installation".

B. Wherever the term "install" appears in documents, interpret to mean "Assemble, wire and connect loose-shipped components on site. Place in position for service or use, including material, labor, accessories, services, and testing. Wire, connect, and render fully operational for intended use ". Note that most products to be installed shall also be furnished under Division 26, though some products require only installation under Division 26 - depending on context and application.

C. Wherever the terms "provide", "include", “shall be”, “to be", “equip with”, “consisting of”, or similar terms appear in documents, interpret to mean "Furnish and Install".

D. Wherever the word "work" appears in documents, interpret to mean “material, labor, accessories, services, testing, etc. as required to render respective work fully operational”.

E. Wherever the word “flush” appears, interpret to mean “recessed in respective surface with visible face flush and even with respective surface”.

F. Wherever the words "(the) (this) contractor", "(the) (this) subcontractor", "E.C./EC", “electrical contractor”, “electrical subcontractor” or similar terms appear in Division 26 specifications or on electrical drawings, they refer the entity responsible for providing electrical work indicated on electrical drawings, and Division 26 Project Manual sections.

1.07 EXPLANATION AND PRECEDENCE OF DRAWINGS

A. For the purposes of clearness and legibility, drawings are essentially diagrammatic and although size and locations of equipment are drawn to scale wherever possible, make use of data on drawings and verify information at building site.

B. The drawings indicate required size and points of termination of conduit and partially suggest proper routes to conform to the structure, avoid obstructions and preserve clearances. However, it is not intended that drawings indicate necessary offsets. Install conduit and equipment in such manner as to conform to structure, avoid obstructions, preserve headroom and keep openings and passageways clear without further instructions.

C. Coordinate work with affected entities and installers. Locate and install equipment and devices accordingly. Refer to coordination drawings of other trades.

D. Locate apparatus be located symmetrical with architectural elements and install at exact height and locations as shown on architectural drawings.

E. Fully research peculiarities and limitations of space available for installation of work along with materials to be furnished and installed. Exercise due and particular caution to ensure that parts of the installed work are made quickly and easily accessible. Although the locations of the equipment and conduit may be shown on the drawings in certain positions, be guided by the architectural details and conditions existing at the job site, correlating electrical work with that of others. Provide offsets as required to provide a neat workmanlike arrangement.

1.08 SUBMITTALS

A. Provide Equipment List for items of material and equipment, which must be reviewed by the Engineer prior to the start of work. Provide submittals in a timely manner allowing for long lead items. No item of equipment will be permitted on the site until acceptance of that equipment has been given. Provide copies of drawings and manufacturer cuts and performance data for Engineer's review. Organized in same order as listed in equipment list and include reference to page and paragraph numbers of the specifications. Bind in identical sets. Do not purchase material until the submittals are approved by the Engineer.

B. Clearly indicate sufficient definition in submittals so they can be properly reviewed for compliance with documents.

C. Refer to Division1 Section pertaining to Submittals.

1.09 MATERIALS AND EQUIPMENT

A. Unless specifically indicated otherwise provide (furnish and install) all specified and drawn equipment, raceway, boxes, luminaires, controls, wiring, cabling, supports and other materials as required to render all electrical and electrically operated equipment, luminaires, devices, etc. fully operational. Unless specifically indicated otherwise provide (furnish and install) all materials that are specified under Division 26. Discrepancies or uncertainties perceived by a bidder, or other questionable interpretations by a bidder, are subject to final interpretations and decisions by the owner's representative unless addressed before bidding by addendum or unless qualified or excepted within bids.

B. Provide materials that are new, full weight, of the best quality. Provide similar materials that are of the same type and manufacturer. Provide materials, apparatus and equipment with Underwriter's Laboratory, Inc. label where regularly supplied.

C. Maintain safety and good condition of the materials and equipment installed until final acceptance by the Owner. Store materials to prevent damage and weathering prior to installation.

D. When several materials, products or items of equipment are specified by name for one use, select one of those specified.

E. Provide material manufacturers equal in quality, performance, aesthetics, and product support (factory and local) to that specified as basis of design. Other products, material, article, device, fixture or form of construction not mentioned as approved equal is subject to advance review by the Engineer and possible rejection.

1.10 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver equipment and materials according to factory shipping requirements. Pack components in factory-fabricated protective containers. Deliver units in sections of such size as will pass through available openings.

B. Store equipment and materials in clean dry place and protect from weather and construction traffic. When stored inside, do not exceed structural capacity of the floor.

C. Handle and rig work for equipment and products as recommended by the manufacturer. Do not install components and equipment damaged during shipment or handling - return damaged components to the manufacturer and replace with new.

1.11 QUALITY ASSURANCE

A. Provide references on request that demonstrate ability to perform work of this division, including list of past projects similar in size, scope of work and complexity.

B. Interpret specifications in connection and conjunction with the drawings. If work is shown on drawings and not mentioned in the specifications, or vice versa, provide the work as though clearly set forth by both.

C. Provide materials and labor required to fully complete the work even though each item necessarily involved may not be specifically mentioned or shown. Provide such work and materials of the same grade or quality as the parts actually specified and shown.

D. Provide the quantity and quality levels indicated as a minimum. In complying with these requirements, indicated numeric values are minimum or maximum, as appropriate for the context of the requirements. Should there be a conflict between the plans and specifications, provide the greater quantity and better quality.

E. Install equipment and materials in strict accordance with manufacturer's written instructions.

F. Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified by applicable UL Standards. Accomplish tightening by utilizing proper torquing tools, including torque screwdriver, beam-type torque wrench, and ratchet wrench with adjustable torque settings. Ensure that sealing grommets expand to form watertight seal.

G. Upon completion of installation of equipment and electrical circuitry, energize circuitry and demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting.

H. Prior to energizing, check installed wires and cables with megohm meter to determine insulation resistance levels to assure requirements are fulfilled. Prior to energizing, test wires and cables for proper phase to phase connections, for electrical continuity and for short-circuits. Ensure that direction of rotation of each motor fulfills requirement.

I. Furnish the service of an experienced superintendent who is constantly in charge of the work, together with qualified journeymen, wiremen and specialists as required to properly install, connect, adjust, start, operate and test the work involved.

J. The superintendent's qualifications are subject to the review and acceptance by the owner's representative. Unless the owner's representative grants prior special permission, utilize the same electrical superintendent throughout the duration of the project.

1.12 CLEANING EQUIPMENT AND PREMISES

A. Clean parts of the apparatus and equipment. Clean exposed parts of cement, plaster and other materials. Remove oil and grease spots. Carefully wipe such surfaces and neatly scrape out corners and cracks.

B. Brush down exposed metal work with steel brushes to remove rust and other spots and leave them smooth and clean. Remove trapped elements during cleaning and flushing period, after which replace and adjust them.

C. During the progress of the work, clean up and leave the premises and portions of the building in which work has occurred in a clean and safe condition. Provide this cleaning on a daily basis.

1.13 PROGRAMMABLE AND SOFTWARE OPERATED EQUIPMENT

A. This subsection applies for systems that incorporate microprocessor based equipment and components. The systems themselves are specified elsewhere within Project Manual.

B. Provide detail design, accessories, equipment, devices, wiring, and programming as required to render systems fully operable. Program, check, and test each system using respective certified factory technician. After making tests and corrections, demonstrate systems to owner's representatives and authorities having jurisdiction.

C. Provide complete design and installation drawings using information supplied by respective system supplier. Show layouts, conduit sizes, number and types of cables/conductors required to components, and detailed wiring connections required at each type of device. Provide these submittals in full compliance with requirements of authorities having jurisdiction.

D. Provide latest release of system software (furnished, installed and adapted). Provide upgrade(s) at final close-out of project, where system software originally installed has been upgraded since it was originally installed.

E. Provide custom programming described below for programmable systems, and for systems with room number identifications that are required for successful system operation. Wherever the term "programming" is used below, interpret it to mean "programming, configuration and identification".
   1. Provide custom programming. Room names and numbers may change from architectural drawing names and numbers to actual operational room names and numbers; program using actual operational names and numbers. Provide interim and permanent programming and configuration work as required to render and maintain systems in full operation.
   2. Provide programming related services (including machine language, English language, etc.) associated with rendering work fully operational, and neatly document in detail. Archive intermediate and final programming work. Provide, replace and re-burn EPROM's and other integrated circuits as required to accommodate construction schedules and progress.
   3. Provide custom and detailed programming to a level satisfactory to the Owner, including correct operational room numbers, and room names. Provide neatly typed orderly and logical submittal of proposed programming for review; prior to entering data; revise this submittal as much as required to satisfy the Owner. Determine project-specific requirements in field.
   4. Provide programming for auxiliary control and interface functions. Provide custom programming for address labels. Provide detailed English language print statements for each system point/address, and for each respective auxiliary control sequence. Include in these print statements as many characters, sentences, lines, or paragraphs required to provide extremely detailed descriptions of system status including alarm or trouble condition, and status of related auxiliary controls. Provide level of detail acceptable to the Owner. Provide clear specific English language descriptions for remote annunciators.

F. Become familiar with existing characteristics, devices, equipment, cabling, configuration, components and programming of affected systems so that expansions, extensions, and retrofits are fully compatible with the existing conditions. Provide a complete fully operable systems accordingly.

G. Provide programming services for new work, for retrofit work, and for interfaces with new and existing systems. Provide schedule for cross-reference of new system labels to nomenclature used to enter them into existing systems.

H. Verify that the system is in proper working order prior to beginning work on an existing system. If not, bring defects to the attention of the owner’s representative. If no notification occurs, it is assumed that the system was in working order. Provide remedial work for subsequent system problems that occur, if any.

I. Account for, and indicate, differentiation for construction phasing and sub-phasing on submittals. Provide custom services and programming (including machine language,

English language, etc.), testing, certification, and documentation after each phase (and sub-phase) of the project (for projects with multi-phase construction) as required to render systems fully operable after each construction phase. Change room names and numbers from architectural drawing names and numbers to actual operational room names and numbers, after each phase of construction. Provide these services also at the end of construction phases, including programming of final room names and numbers.

J. Provide interim, and permanent, programming and configuration work. Replace or re-burn EPROM's, and other integrated circuits, as required to accommodate multiple construction phases. Do not begin warrantee periods until final acceptance of work by the Owner after completion of the final construction phase.

1.14 PROJECT CLOSEOUT

A. General
1. Refer to Division1 Section pertaining to Project Closeout.
2. Furnish certificates of final inspection and approval prior to final acceptance of this branch of the work.
3. Test electrical work and ensure that it rings entirely free from ground.
4. At the conclusion of the project when the system is in full operation, make a final balance of circuits. Provide necessary labor, metering, etc., to accomplish this task. Provide written documentation.
5. Provide proper instruction of equipment and systems to the satisfaction of the owner's representative.
6. Make arrangements for a meeting at such time as will be convenient to entities concerned for the purpose of instructing the designated personnel on the correct operation and maintenance of each individual system furnished and each system installed. Video-record these instructions (mpg format or equivalent) with one DVD submitted for each O & M manual.

B. Maintenance Manuals
1. Provide description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
2. Provide manufacturer's printed operating procedures including start-up, break-in, normal operating instructions, regulation, control, stopping, shutdown, and emergency instructions.
3. Provide maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Provide index, typed at front w/typed tabs for each section; Provide lists of materials and equipment furnished with name, address and telephone number of vendor.
5. Provide itemized list of each piece of mechanical equipment having electrical connections with circuit and panelboard locations. Also list with each item related expendable equipment required such as fuse size and type, pilot lights, Cat. no. of magnetic starter overload, etc.
6. Provide Operating Instruction Manuals and Service Manuals for equipment furnished. Provide a complete set of final approved shop drawings as submitted during construction.
7. Provide an itemized list of each fixture type with catalog number of replacement lamps and ballasts. Provide a complete spare parts schedule for components of equipment furnished; provide schedules that are not factory generic information, but accurate for the equipment actually provided.
8. Provide a complete set of detailed wiring diagram and schematic drawings for components of systems furnished; provide drawings that are not factory generic information, but are complete and accurate for the equipment actually provided.

C. Record Documents

1. Obtaining two complete sets of electrical prints and use them to provide progress record drawings which are separate, clean, prints reserved for the purpose of showing a complete picture of the work as actually installed (including routing of conduit and cables). These drawings also serve as work progress report sheets. Make notations, neat and legible thereon daily as work proceeds. Make these drawings available for inspection at all times and keep them at the job at a location designated by the owner's representative.
2. Maintain the clean, undamaged set of prints of drawings as well as a set of submittal drawings and coordination drawings. Mark the sets to show the actual installation where the installation varies from the Documents as originally shown. Include locations of underground and concealed items if placed other than shown on the Documents. Do not permanently conceal construction until this required information is recorded. Mark which drawing is most capable of showing conditions fully and accurately. Where shop drawings are used, record a cross-reference at the corresponding location on the Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
3. Show changes in: size, type, capacity, etc., of material, device or piece of equipment, location of device or piece of equipment; location of outlet or source of building service systems; routing of piping, conduit, or other building services. Record location of concealed equipment, electrical service work, conduits and other piping/work by indication of measured dimensions to each line from readily identifiable and accessible walls or corners of building. Indicate approved substitutions, modifications, and actual equipment and materials installed.
4. For electrical work installed below slabs, pavements, grade, etc., record location of nearby concealed water piping, sewers, wastes, vents, ducts, conduit and other piping, etc. by indication of measured dimensions to each line from readily identifiable and accessible walls or corners of building and from adjacent electrical work. Show invert elevation of underground electrical work relative to work installed by other trades.
5. Affix near the titleblock on each drawing the Contractors' Company Names, signature of Contractors' Representative and current date.
6. Provide "as-built" record documentation for submittals and coordination drawings .

1.15 GUARANTEE

A. General

1. Provide a guarantee in written form stating that work, materials, equipment and parts are warranted to be free of defect for a period of one year from the date of owner's final acceptance, and defects will be repaired, revised or replaced (owner’s option) at no cost to the owner if such defects occur within the guarantee period. Also state in written form that occurrences arising during the guarantee period will be attended to in a timely manner and will in no case exceed four (4) working days from date of notification by owner. Replace defective items to the satisfaction of the owner's representative and the Engineer.

END OF SECTION

SECTION 26 0002

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 GENERAL

1.01 EXPLOSIVES

A. Do not use explosives.

1.02 WELDING

A. Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel." Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.03 HEIGHT OF BOXES

A. Outlet mounting heights as indicated on the plans are approximate. Determine the exact mounting heights (and locations) of outlets in the field with relation to architectural detail and equipment being served. Coordinate outlet location with equipment, with furniture plans and with architectural elevation plans. Where mounting heights are not detailed or dimensioned, contact the owner's representative for direction.

B. Prior to rough-in, coordinate final mounting heights of system outlet boxes in field with Owner's representative. Install boxes at heights as follows, to center of box, unless directed otherwise in field or otherwise noted on E-series drawings or architectural plans. Height of boxes dimensioned from ceiling apply to rooms having ceilings 9' or less; in rooms having higher ceilings, locate these as directed in the field.

Switches – Counters	44” (field verify & match counter recept. heights)
Receptacles - Elsewhere	18”
Circuit Breaker Panelboards	72” to top of panel unless special circumstances are indicated or otherwise apply
Wall Mounted Luminaires	As noted on plans or as directed by Architect
Control Stations	48”
Data Outlets	18”
Other Outlets/Fixtures/Equipment	As directed by Architect

1.04 ACCESS DOORS

A. Do not use access doors used unless special prior written permission is granted from the Owner's representative. Install pull boxes, junction boxes, etc. in areas which are accessible after completion of construction. Do not install pull boxes or junction boxes above gypsum board or similar inaccessible ceiling systems. Where there is no other recourse but to provide an access door/panel, and where approval of Owner’s representative has been obtained, provide required access doors/panels as required for a complete code-compliant electrical installation as defined below.

B. For installation in masonry, concrete, ceramic tile and wood paneling provide 1 inch-wide-exposed perimeter flange and adjustable metal masonry anchors. For gypsum wallboard and plaster provide perforated flanges with wallboard bead. For full-bed plaster applications provide galvanized expanded metal lath and exposed casing bead, welded to perimeter of frame.

C. Set frames accurately in position and securely attached to supports, with face panels plumb and level in relation to adjacent finish surfaces. Adjust hardware and panels after installation for proper operation. Provide locking devices that are flush screwdriver-operated cam locks.

D. Provide factory-fabricated and assembled units, complete with attachment devices and fasteners ready for installation. Provide continuously welded steel joints and seams, with welds ground smooth and flush with adjacent surfaces. Provide frames that are 16-gage steel, with a 1-inch-wide exposed perimeter flange for units installed in unit masonry, pre-cast or cast-in-place concrete, ceramic tile and wood paneling. Provide Standard Flush Panel Doors that are 14-gage sheet steel, with concealed spring hinges or concealed continuous piano hinge set to open 175 degrees; factory-applied prime paint. Provide Fire-Rated Units that are insulated flush panel doors, with continuous piano hinge and self-closing mechanism.

E. Subject to compliance with requirements, provide products by one of the following:
1. Bar-Co., Inc.
2. J.L. Industries.
3. Karp Associates, Inc.
4. Milcor Div. Inryco, Inc.
5. Nystrom, Inc.

1.05 ELECTRICAL INSTALLATIONS

A. Install work conduit, wiring, outlet box type work in finished areas concealed. Such work installed in unfinished areas may be exposed at the discretion of the Owner's representative.

B. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for electrical installations. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the work.

C. Provide systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible.

D. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and architectural/structural components.

E. Install electrical equipment to facilitate servicing, maintenance, and repair and replacement of equipment components. Install equipment for ease of disconnecting, with minimum of interference with other installations. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope. Protect the structure, furnishings, finishes, and adjacent materials.

F. Verify dimensions by field measurements. Take measurements and be responsible for exact size and locations of openings required for the installation of work. Figured dimensions are reasonably accurate and should govern in setting out work. Where detailed method of installation is not indicated or where variations exist between described work and approved practice, follow direction of the owner's representative.

G. Provide branch subfeeder circuits as shown on the plans. The symbols used to indicate the purpose of which the various outlets are intended are identified in the Electric Legend. Where outlets are indicated by letters on plans, provide corresponding switches to control them.

H. Provide no wire size smaller than No. 12 for branch circuits unless otherwise noted on plans for control circuits. Provide larger sizes where required by prevailing codes or indicated on contract documents. Provide neutral conductor for all multi-pole feeders. Provide neutral conductor(s) for all multi-pole feeders and branch circuits unless this contractor determines in field that the affected load(s) will never have need for a neutral conductor and NEC does not mandate otherwise. Provide minimum 3/4” conduit size.

I. Do not install device wall outlets directly back to back, where located on opposite sides of common walls. Offset outlets by at least two feet for applications in fire rated walls and smoke rated walls and applications in acoustically treated walls. Offset outlets by at least one foot for other applications.

J. Provide wires continuous from outlet to outlet and properly splice joints. Provide insulation value for joints 100% in excess of that of the wire. Mechanical wire splicers may be used. Where friction and rubber tape is used, provide tape conforming to Federal Specifications HH-T-11 and HH-T-111. Where plastic electrical tape is used, provide Scotch #33, or approved equal. Provide minimum 8" tail for conductors terminating at each wired outlet at their outlet fittings to facilitate installment of devices, luminaires, etc.

K. If during construction it becomes apparent that some specific minor changes in layout will effect a neater job or better arrangement, make such alterations without additional compensation and without having to offer credit.. Obtain Engineer's review before making such changes.

L. Provide workmanship throughout that conforms to the standards of best practice. Marks, dents and finish scratches are prohibited on exposed materials, luminaires, fittings, etc. Clean inside of panels and equipment boxes.

1.06 COORDINATION

A. Commence with coordination in a timely manner. Subsequent additional compensation, special allowances, additional construction time, etc. will not result from failure to coordinate (including providing related information to other trades for review) in a timely manner. Do not fabricate or install work before properly coordinating with other trades.

B. Plans are diagrammatic indicating design intent and indicating required size, points of termination and, in some cases, suggested routes of raceways, etc. However, it is not intended that drawings indicate fully coordinated conduit routing, necessary offsets, etc. The drawings are an outline to indicate the approximate location and arrangement of ductwork, piping, equipment, outlets, raceways, cables, etc. Install piping, conduit, raceways, cable assemblies, etc. as straight as possible and symmetrical (perpendicular to or parallel with) with architectural items. Work in and on the building installed diagonal to building members is prohibited.

C. Consult the plans of other trades before installing work so that work will not interfere with those.

D. Participate in coordination efforts and in preparation of coordination drawings prior to fabrication or installation of equipment, materials, etc. Coordinate actual clearances of installed equipment. Coordinate exact location of electrical outlets, lighting fixtures, conduits, raceways, equipment, cable assemblies, applicable devices, etc. well in advance of installation so there will be no interferences at installation between the various trades.

E. Ensure that work and working clearances in electrical rooms and similar spaces complies with NEC Article 110. This also applies to finalizing locations of disconnects, starters, contactors and other electrically operated equipment that may require testing or maintenance while energized.

F. Coordinate and correct conflicts in equipment and materials prior to installation. If a conflict cannot be resolved, refer the matter to the owner's representative for a final decision as to method and material.

1.07 IDENTIFICATION

A. General
   1. Submit manufacturer's data on electrical identification materials and products. Submit detailed nameplate schedule indicating proposed nomenclature, colors,

text heights, fastening methods, etc. If requested by Owner's representative, submit samples of each color, lettering style and other graphic representation required for each identification material and system.

2. Except as otherwise indicated, provide manufacturer's standard products of categories and types required for each application. Where more than single type is specified for an application, selection is Installer's option, but provide single selection for each application. Where identification is to be applied to surfaces which require finish, install identification after completion of painting. Comply with governing regulations and requests of governing authorities for identification.

B. Cable and Conductor Identification

1. Provide manufacturer's standard vinyl-cloth self-adhesive conductor markers of wrap-around type, either pre-numbered plastic coated type, or write-on type with clear plastic self-adhesive cover flap; numbered to show circuit identification. Provide on conductors. Provide color coded insulation for conductors. provide color coded jackets for cables. Match color schemes with marking system used in submittals, contract documents, industry standards, etc. Apply cable/conductor identification on each cable in each box/enclosure/cabinet for cables that are not available with color coded insulation or jackets.

2. Use the following insulation color code for power system and voltage identification. This applies to both feeder and branch circuit wiring. Do not interchange colors. The use of Scotch color coding tapes for phase identification may be used on feeder cables only (#4 AWG and larger).

a.	480Y/277V System	Brown, Orange, Yellow & Gray (neut.)
b.	208Y/120V System:	Black, Red, Blue & White (neutral)
c.	Electronic Ground:	Green with Yellow tracer (neutral)
d.	Equipment Grounding:	Green

C. Raceway Identification

1. Provide manufacturer's standard self-adhesive vinyl tape not less than 3 mils thick by 1-1/2" wide. Unless otherwise indicated or required by governing regulations provide black lettering on orange base with minimum 1/2" high lettering. As a minimum, neatly install markers at each and every entry point to rooms, junction boxes, pull boxes, equipment connections, etc. Do not install these markers on exposed raceways in finished areas that will be occupied.

2. Where electrical conduit is exposed in spaces with exposed mechanical piping which is identified by color-coded method, provide painted color-coded identification on electrical conduit, boxes, etc. in color schemes as indicated on the chart at the end of this section unless otherwise directed in field.

D. Emergency Systems

1. Provide permanent identification for boxes, enclosures, etc. that are associated with emergency system work. Paint and identify emergency system pull boxes, junction boxes, and other access/pull points (boxes and covers) in accordance with NEC. Provide emergency system equipment panelboards, cabinets, enclosures, etc. with red mechanically fastened engraved nameplates with the first line of text to read "EMERGENCY CIRCUITS" and the remaining lines to include the necessary descriptive text.

E. Fire Alarm Systems

1. Provide permanent identification for boxes, enclosures, etc. that are associated with fire alarm system work. Paint and identify fire alarm system pull boxes, junction boxes, and other access/pull points (boxes and covers) in accordance with NEC/NFPA. Provide fire alarm system control panel equipment cabinets, enclosures, etc. with red mechanically fastened engraved nameplates with the first

line of text to read "FIRE ALARM" and the remaining lines to include the necessary descriptive text.

F. Underground Cable Marking
1. Provide manufacturer's standard permanent, bright-colored, continuous-printed plastic tape, intended for direct-burial service; not less than 6" wide X 4 mils thick. Provide tape with printing which most accurately indicates type of service of buried cable. During back-filling/top-soiling of each exterior underground electrical, signal or communication cable, install continuous underground-type plastic line marker, located directly over buried line at 6" to 8" below finished grade. Where multiple small lines are buried in a common trench and do not exceed an overall width of 16", install a single line marker. Install line marker for every buried cable, regardless of whether direct-buried or protected in conduit.

G. Underground Cable Identification
1. Provide correct identification on conductors and cables installed in manholes, grade mounted junction boxes and handholes. Provide tag in each location with not less than two tags per cable, one near each duct through which the cable enters and leaves the hole. Attach tags immediately after cable is installed. Provide tags of non-corroding metal and plainly marked (engraved). Provide tags that are circular in shape, 2 inches in diameter (minimum) and of not less than 0.020" thick copper or brass. Steel lettering dies, 1/4" minimum height of letters and figures, or the equivalent engraving process, may be used to mark the tags. Mark the tags to contain an abbreviation of the name of the system/facility served by the cable. Field verify identification nomenclature prior to fabrication of tags. Attach tags in strict accordance with manufacturer's recommendations. The identification described below is shown for schematic purposes only.

a.	"6"	600V
b.	"1"	Under 100V Class of System
c.	"P"	Power
d.	"C"	Control
e.	"EM"	Emergency
f.	"A,B,C,N"	Phases and Neutral

H. Operational Identifications and Warnings
1. Provide pre-manufactured operational and warning signage if indicated on drawings and where required by NEC or local authority having jurisdiction.

I. Engraved Plastic-Laminate Signs
1. Provide signs at locations for best convenience of viewing without interference with operation and maintenance of equipment. Secure to substrate with stainless steel fasteners, except use permanent adhesive where fasteners should not or cannot penetrate substrate.
2. All equipment & system identification nomenclature shown on drawings and listed herein is shown for general design and installation reference only. Field verify the actual nameplate, etc. nomenclature prior to fabrication. Prepare record documents accordingly. Unless determined otherwise in field, provide text matching terminology and numbering of the contract documents and submittals.
3. Unless directed otherwise, provide black face and white core plies (letter color) for normal power applications and red face and white core plies (letter color) for emergency power applications, punched for mechanical fastening except where adhesive mounting is mandatory because of substrate. Provide 1/2" minimum text height for equipment identification and 1/4" minimum text height for nameplates with narrative descriptions/instructions. Provide 1/16" thickness for units up to 20 sq. in. or 8" length; provide 1/8" thickness for larger units. As a minimum provide signs for each unit of the following categories of electrical work where such work exists on the project.

a. Starters, disconnects, contactors and control stations.
b. Panelboards, electrical cabinets and enclosures.
c. Transformers.
d. Control panels for systems.
e. Electrical main distribution panels, switchboards and switchgear (include company name of engineer and installer at service entrance switchboards).
f. Switch wallplates (via engraving) for switches that control remote lights or loads.
g. Other similar equipment designated by owner's representative or engineer in field.

1.08 CUTTING, PATCHING AND SEALING

A. General

1. Comply with requirements of Division 07 “Thermal and Moisture Protection”.
2. Provide cutting and patching for the admission of work. Perform cutting, fitting, and patching for electrical equipment and materials as required to:
   a. Uncover Work to provide for installation of ill-timed Work.
   b. Remove and replace defective Work.
   c. Remove and replace Work not conforming to requirements of the Contract Documents.
   d. Remove samples of installed Work as specified for testing.
   e. Install equipment and materials in existing buildings.
3. Upon written instructions from the owner's representative, uncover and restore work to provide for observation of concealed work by owner's representative or by inspection authority having jurisdiction.
4. During cutting and patching operations, protect adjacent installations (structure, finishes, furnishings, etc.). Where applicable, provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to system components and components of other trades.
5. Patch surfaces and building components using new materials matching existing materials as applicable and using experienced Installers. Refer to Division 1 for definition of experienced "Installer" or determine qualifications as directed in field by owner's representative.
6. Patch through fire rated walls and enclosures in a manner that does not diminish the rating of that wall or enclosure. Provide materials used for patching to meet or exceed the smoke and fire rating of the respective surface being patched.
7. Neatly cut and drill openings in walls and floors required for the installation. Secure approval of Owner's Representative before cutting and drilling in work that is already in place. Neatly patch openings cut.
8. Hold cutting and patching to a minimum by arranging with other trades for sleeves and openings before construction is started.
9. Provide factory-assembled watertight wall and floor seals, of types and sizes required; suitable for sealing around conduit, pipe, and tubing passing through concrete floors and walls. Construct seals with steel sleeves, malleable iron body, neoprene sealing grommets and rings, metal pressure rings, pressure clamps, and cap screws.
10. Fabricate pipe sleeves from Schedule 40 rigid, heavy wall, full weight galvanized steel pipe; remove burrs. Use sleeves which are two standard sizes larger than conduit passing through respective sleeve.
11. Provide sleeve seals for piping which penetrates foundation walls below grade, exterior walls and roofs, caulk between sleeve and pipe with non-toxic, UL-classified caulking material to ensure watertight seal. Elsewhere modular provide mechanical type seals, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and

pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

12. Provide standard Schedule 40 black steel pipe sleeves two sizes larger than pipes passing through floors, bearing walls and masonry construction. Cut sleeves through walls flush with both faces. Extend sleeves through floors one inch above floor top elevation. Provide a pipe curb assembly equal to Pate Co. for piped penetrating roof. Furnish and set forms required in masonry walls and foundations to accommodate pipes.

B. Grout

1. Provide non-shrink, nonmetallic grout, premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout, recommended for interior and exterior applications.

C. General Joint Sealer Application

1. Provide joint sealers, joint fillers, and other related materials compatible with each other and with joint substrates under conditions of service and application.
2. Apply joint sealers under temperature and humidity conditions within the limits permitted by the joint sealer manufacturer. Do not apply joint sealers to wet substrates.
3. Clean affected surfaces, joints, etc. immediately before applying joint sealers to comply with recommendations of joint sealer manufacturer.
4. Apply sealant primer to substrates as recommended by manufacturer. Protect adjacent areas from spillage and migration of sealant, using masking tape. Remove tape immediately after tooling without disturbing seal.
5. Comply with joint sealer manufacturers' printed application instructions applicable to products and applications indicated, except where more stringent requirements apply.
6. Comply with recommendations of ASTM C 962 for use of elastomeric joint sealers.
7. Comply with recommendations of ASTM C 790 for use of acrylic-emulsion joint sealants.
8. Immediately after sealant application and prior to time shinning or curing begins, tool sealants to form smooth, uniform beads; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
9. Provide colors for exposed seals that are selected by the Owner's representative from manufacturer's standard colors.

D. Elastomeric Joint Sealers

1. Comply with requirements of Division 07 Section “Joint Sealants”.
2. Provide one-part, nonacid-curing, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for masonry, glass, aluminum, and other substrates recommended by the sealant manufacturer.
3. Provide one-part, mildew-resistant, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for glass, aluminum, and nonporous joint substrates; formulated with fungicide; intended for sealing interior joints with nonporous substrates; and subject to in-service exposure to conditions of high humidity and temperature extremes. Provide silicone sealant equal to the following:
    a. "Dow Corning 790", Dow Corning Corp.
    b. "Gesil N SCS 2600", General Electric Co.
    c. "Dow Corning 786", Dow Corning Corp.

E. Acrylic-Emulsion Sealants

1. Provide one-part, non-sag, mildew-resistant, paintable complying with ASTM C 834 recommended for exposed applications of interior and protected exterior

locations involving joint movement of not more than plus or minus 5 percent. Subject to compliance with requirements, provide one of the following:
   a. "Chem-Calk 600", Bostik Construction Products Div.
   b. "AC-20", Pecora Corp.
   c. "Sonolac", Sonneborn Building Products Div.
   d. "Tremco Acrylic Latex 834", Tremco, Inc.

F. General Fire Stopping Material Application
   1. Fire stopping requirements/locations are not indicated on electrical drawings. Review architectural and other drawings to determine fire/smoke rated walls and floors and rating requirements of same. Provide required fire stopping work associated with electrically related penetrations. Provide fire stop pillows, putty or sealant, as applicable, with minimum UL classification for 3 hour fire and cold side temperature ratings.
   2. Clean affected surfaces, joints, etc. immediately before applying fire stopping to comply with recommendations of manufacturer.
   3. Comply with fire stop material manufacturers' printed application instructions applicable to products and applications indicated, except where more stringent requirements apply.
   4. Install fire stop materials, including forming, packing, and other accessory materials, to fill openings around electrical services penetrating floors and walls, to provide fire-stops with fire-resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agency.
   5. Caulk between sleeves and pipes with rockwool and caulk around sleeves with sealing compound that meets applicable fire ratings required.
   6. Provide patch equal to rockwool, firestop, caulk or approved "rated" patch.
   7. Where a smoke or fire-resistance classification is indicated on architectural drawings or otherwise, provide the following as applicable.
      a. Fire stop pillows, putty or sealant with minimum UL classification for 3 hour fire and cold side temperature ratings for electrically related penetrations.
      b. Access door assembly with panel door, frame, hinge, and latch from manufacturer listed in the UL "Building Materials Directory" for rating required; Provide UL Label on each fire-rated access door.

G. Wall and Floor Opening Fire Stopping for Open Cable Tray and J-Hook Paths
   1. Provide Fire Stop Pillows equal to Nelson FSP #AA500 PLW or #AA501 PLW as applicable, UL Classified for 3 hour fire and cold side temperature ratings, quickly removable and reusable, non-toxic and requiring no special tools.

H. Wall/Floor Opening Fire Stopping for Work Likely to Need Ongoing Moves/Adds/Changes
   1. Provide Fire Stop Putty equal to Nelson FSP #AA400 series, UL Classified for 3 hour fire and cold side temperature ratings, reusable when penetrating items are removed or added and requiring no special tools, mixing, curing or drying time.

I. Fire Stopping for Other Wall and Floor Openings
   1. Provide Fire Stop Sealant equal to Nelson #AA491 series, UL Classified for 3 hour fire and cold side temperature ratings, non-sagging, permanently flexible, non-toxic, non-shrinking, water/air/smoke-tight and easily repenetrated. Provide firestopping materials for the following locations:
      a. For Floor Openings
      b. For Wall Openings
      c. Mineral Felt
      d. For Insulated Pipes
      e. For Fill Areas
   2. Apply sealant primer to substrates as recommended by manufacturer. Protect adjacent areas from spillage and migration of primers, using masking tape. Remove tape immediately after tooling without disturbing joint seal.

3. Immediately after sealant application and prior to time shinning or curing begins, tool sealants to form smooth, uniform beads; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or that are not approved by sealant manufacturer.

END OF SECTION

SECTION 26 0501

EXISTING CONDITIONS AND DEMOLITION

PART 1 GENERAL

1.01 RELATED WORK

A. Where the term “demolition” is used herein, interpret it to mean “demolition” or “selective demolition” as applicable.

B. Perform a detailed pre-bid walk-through field inspection to review the existing structures and premises, to determine existing conditions, and to determine scope of required electrically related demolition work. Include applicable accessible ceiling cavity areas in this inspection.

C. It is not the intent of these this section, or of drawings, that existing conditions be accurately shown. Existing electrical work is shown to a very limited extent on drawings and is shown for general planning reference only. Locations and information were derived from cursory visual observations or from portions of documents that were prepared for previously installed work (not from record drawings or "as-builts").

D. Do not reuse removed electrical materials unless specifically indicated in project manual or on drawings. Existing wiring systems may be utilized only to the extent indicated in project manual, or on drawings, or as directed by Owner's representative in field.

E. Hold routing of new raceways in existing buildings as tightly as possible to the structure above. Obtain approval of owner's representative prior to installation.

1.02 AFFECT ON ADJACENT OCCUPIED AREAS

A. Maintain existing electrical service and feeders to occupied areas and operational facilities, unless otherwise indicated, or when authorized otherwise in writing by owner’s representative. Provide temporary service during interruptions to existing facilities. Schedule momentary outages when necessary for replacing existing wiring systems with new wiring systems. When that "cutting-over" has been successfully accomplished, remove related wiring that has been abandoned.

B. Locate, identify, and protect electrical services passing through demolition areas and serving other areas outside the demolition limits. Maintain services to areas outside demolition limits. When services must be interrupted, install temporary services for affected areas.

C. It is recognized that there may be some conduit systems rendered inactive by demolition, causing disconnection of "downstream" outlets, etc. Investigate these types of conditions (for all systems) prior to demolition. Provide necessary corrective electrical work prior to demolition to ensure that such "downstream" devices remain permanently active throughout demolition, during new construction, and after project completion.

D. Carefully coordinate work and system shutdowns in advance with owner's representative, and with affected trades so that normal building activities and other construction trades are minimally affected. Perform electrically related demolition and new construction work, which will affect an occupied area (including those which are located outside the immediate area of project work) at special times as directed by owner's representative in field.

E. Determine which existing branch circuits must remain active. Reconnect (or maintain in operation as applicable) and schedule them. Completely re-type panelboard directories for panelboards affected by this project using accurate information for information. Where applicable ensure that reconnected shared neutrals are properly balanced with the

correct phase conductors. Where applicable provide correct color-coding for insulation of reconnected conductors in a manner compliant with NEC.

F. Provide work in a manner that ensures existing systems and components remain fully operational in occupied spaces during occupied periods.

G. Provide and maintain temporary partitions and dust barriers adequate to prevent the spread of dust and dirt to adjacent finished areas and other system components. Protect adjacent installations during cutting and patching operations. Remove protection and barriers after demolition operations are complete.

1.03 GENERAL DEMOLITION

A. Provide electrical demolition work as required to accommodate project demolition and as required to accommodate new construction.

B. Disconnect and remove work to be abandoned, and as required to accommodate work of other trades, in areas affected by this project unless specifically noted otherwise on plans or determined otherwise during pre-demolition survey.

C. Remove accessible abandoned, inactive and obsolete raceway systems. Remove abandoned, inactive and obsolete wiring and controls. Remove abandoned, inactive and obsolete equipment, luminaires and devices. Abandoned raceways embedded in floors, walls, and ceilings may remain if such materials do not interfere with new installations. Remove abandoned electrical materials above accessible ceilings.

D. Remove related abandoned unused raceway back to the nearest respective "upstream" junction box that remains active even if outside of the confines of the project area.

E. Remove abandoned unused wiring back to its source even if sources are outside the confines of the project area.

F. Extend raceway and wiring as required to accommodate new or relocated electrical work.

G. Perform cutting and patching required for demolition.

H. Coordinate work carefully with owner prior to beginning electrical demolition work.

I. Maintain (or reconnect if applicable) remaining wiring.

J. Remove and relocate wiring, devices, conduit, etc. that conflict with construction related work of other trades as necessary to accommodate new work of respective trade.

K. Provide electrical disconnections, and reconnections where applicable, for equipment to be removed (or relocated) by other trades.

L. Existing branch circuit and systems conduit, not conflicting with new construction and not conflicting with ceiling cavity requirements, may be re-used at the discretion of the electrical installer. Do not exceed NEC required conduit fill and do not install wiring fed from different sources in common conduit (see Section 26 05 33).

1.04 PRE-EXISTING CODE VIOLATIONS

A. Inspect existing electrical work in areas accessed under this project and bring into compliance with current NEC. This applies only to the extent that such work is uncovered in the immediate project areas affected by demolition or new construction, and only to the limited extent that it applies to pre-existing general installation methods such as missing J.B. plate, open J.B. knockout, minor conduit re-anchoring and minor exposed wiring/connections.

B. If more extensive code or safety violations are discovered, immediately bring them to the attention (detailed in writing) of the Owner's representative along with proposed cost for corrections and with impact (if any) on the construction schedule.

1.05 REMOVED MATERIALS AND EQUIPMENT

A. If required to accommodate construction related activities remove, store in protected location on site, and reinstall conflicting equipment, luminaires, or devices that are to remain or to be relocated.

B. Refer to owner's representative for disposal instructions for abandoned electrical materials removed during demolition and thereafter. Neatly store electrical materials that the Owner elects to retain at the site as designated by the owner's representative. Legally dispose of materials that the Owner elects not to retain.

C. Disconnect and remove electrical materials designated for salvage (removal and reuse, or for turning over to Owner) undamaged. Disconnect and remove wiring and "whips" from equipment terminal points.

D. The following applies to electrical materials that will remain or be reused under this project.
   1. Protect during demolition and construction.
   2. Clean and re-lamp luminaires immediately prior to occupancy of the area.
   3. Clean and service (if service is required) equipment immediately prior to occupancy of the area.

E. Clean components to be reused inside and out, and reinstall where indicated on drawings. Modify and extend related existing wiring in conduit accordingly.

F. Carefully transport salvaged electrical materials to a protected on-site storage location as directed in field and neatly store them grouped by system type.

G. Affected equipment/materials are as follows.
   1. Luminaires.
   2. Wiring devices.
   3. Distribution equipment.
   4. P.A. system devices & equipment.
   5. Video systems devices & equipment.
   6. Telephone system devices & equipment.
   7. Data/communications devices & equipment.

1.06 INTERIM LIFE SAFETY WORK

A. Provide interim electrical fire alarm and life safety protection in demolition and construction areas as indicated below. Contact engineer if further definition is needed.

B. "Bag" existing smoke detectors within project area, and in adjacent areas that are exposed to construction-related dust or airborne particulates, during working periods. Remove "bags" after each shift.

C. Provide temporary emergency egress lighting along egress routes affected by this project. Remove this work when no longer needed.

D. Provide temporary emergency exit lighting along egress routes affected by this project. Remove this work when no longer needed.

E. Provide temporary pull station if required to accommodate an egress route. Remove this work when no longer needed.

F. Provide temporary audio/visual fire alarm annunciation devices along all affected egress routes. Remove this work when no longer needed.

G. Provide 100% temporary smoke detector coverage in areas affected by this project (maximum coverage of 900 square feet per detector with maximum spacing of 30 feet apart and 15 feet from walls). "Bag" these smoke detectors during working periods and remove "bags" after each shift. Remove this work when no longer needed.

1.07 INTERIM AIR QUALITY WORK

A. Prevent airborne dust and particulate matter from entering occupied spaces, and from entering air intakes to operating HVAC systems.

B. Make required openings through walls and floors immediately prior to installation of work. Properly and permanently seal openings immediately after installation of work. Provide temporary seals for applications where penetrations are made but can not be permanently sealed within four hours.

C. Meet with HVAC installer to determine special IAQ requirements that apply to this project. Cooperate fully with HVAC IAQ requirements that affect electrical work and are affected by electrical work.

END OF SECTION

SECTION 26 0519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 RELATED SECTIONS

A. See Division 26 Section 26 00 02 for color coding required for identification of phase, neutral, and ground conductors.

1.02 RELATED WORK

A. This Section includes wires, cables, and connectors for power, lighting, signal, control, and related systems rated 600 volts and less.

B. Install wire in raceway unless specifically permitted otherwise hereafter in this section, under other Division 26 sections, or on electrical drawings.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:
   1. Wire and Cable:
      a. American Insulated Wire Corp.
      b. Brintec Corp.
      c. Cablec.
      d. Carol Cable Co. Inc.
      e. General Cable.
      f. Senator Wire and Cable Co.
      g. Southwire Company.
   2. Connectors for Wires and Cable Conductors:
      a. AMP
      b. 3M Company
      c. O-Z/Gedney Co.
      d. Square D Company.

2.02 GENERAL

A. Provide wire and cable suitable for the temperature, conditions, and location where installed.

2.03 CONDUCTORS

A. Provide copper conductor material for wires and cables unless specifically indicated otherwise on single-line diagram on drawings.

B. Conductor sizes indicated are based on copper unless specifically indicated otherwise on single-line diagram on drawings.

C. In the event that aluminum wiring is permitted for the project, provide the following supplemental work for electrical equipment connections regardless of who furnishes the equipment.
   1. Review equipment submittals, installation documents and nameplates to determine if there are any warranty or UL limitations regarding copper versus aluminum wiring connections at equipment.
   2. If there are any limitations, provide local non-fused disconnect at or near equipment (external to the equipment) and terminate aluminum conductors to the line side terminals of the disconnect switch. Provide copper conductors from load side terminals of the disconnect switch to the respective equipment factory disconnect or terminals as applicable.

3. Coordinate all related work with all affected installers.

D. Provide minimum #12 AWG conductor size.

E. Provide stranded conductors unless indicated otherwise.

F. Provide the following minimum wire sizes based on distances from panel to first device of a 15 or 20 ampere general lighting or receptacle branch circuit. In addition to upsizing conductors as required for voltage drop, provide minimum #10 AWG conductors to the last device for branch circuits more than 150 feet in length.

Distance	AWG Wire Sizes
Up to 60 feet	#12
61 to 90 feet	#10
91 to 150 feet	#8
151 to 240 feet	#6

G. Provide the following minimum AWG conductor sizes for general branch circuiting, based on using copper conductors. Where applicable increase as required to accommodate voltage drop and to accommodate special conditions. Do not derate any grounded (neutral) conductors.

Source Breaker/Fuse	60 Deg. C Rating AWG Wire Size	75 Deg. C Rating AWG Wire Size	Equipment Grounding AWG Wire Size
15 Ampere	#12	#12	#12
20 Ampere	#12	#12	#12
25 Ampere	#10	#10	#10
30 Ampere	#10	#10	#10
35 Ampere	# 8	# 8	#10
40 Ampere	# 8	# 8	#10
45 Ampere	# 6	# 8	#10
50 Ampere	# 6	# 6	#10
60 Ampere	# 4	# 6	#10
70 Ampere	# 4	# 4	#8
80 Ampere	# 3	# 4	#8
90 Ampere	# 2	# 2	#8
100 Ampere	# 1	# 2	#8

H. Provide conductor insulation rated at 600VAC and 90 degrees C. Provide THHN/THWN insulation for conductors size 500 kcmil (MCM) and larger, and for conductors # 8 AWG and smaller. Provide THW or THHN/THWN insulation for other sizes as appropriate for the locations where installed.

I. Provide XHHW-2 insulation for wiring below grade and for wiring subject to moisture conditions.

J. Provide dedicated parity sized insulated (green) equipment ground conductor, per NEC 517, for branch circuit runs serving receptacles in patient care areas. Install wiring for these circuits in steel conduit (not plastic).

K. Provide dedicated parity sized neutral conductor for each branch circuit phase conductor fed from 15 ampere and 20 ampere branch circuit breakers.

L. Provide neutral conductor for all multi-pole feeders. Provide neutral conductor(s) for all multi-pole feeders and branch circuits unless this contractor determines in field that the affected load(s) will never have need for a neutral conductor and NEC does not mandate otherwise.

2.04 TYPE AC/MC CABLES

A. Provide Type AC/MC Cables that are minimum 90 degrees C rated, with components and fittings listed for grounding, and compliant with the following.
   1. UL Std.4 and UL Std. 83.
   2. ANSI E119 and E814.
   3. NEC Articles 250 and 333.

B. Provide cable formed from continuous length of spirally wound, interlocked zinc-coated or galvanized (inside & outside) strip steel. Provide cables with full parity sized green insulated equipment ground conductor.

C. Provide compatible steel fittings with integral red plastic insulated throat bushings, compliant with NEC 350-5.

D. Type AC/MC cable may be utilized only if NEC approved and if approved by local authority having jurisdiction and if included in the limited applications defined below.
   1. Provide for final connections to luminaires that are installed in accessible tile ceiling systems (limited to 6' maximum in length and limited to “whips” from building electrical system junction boxes down to luminaires). Do not install Type AC/MC cable from fixture to fixture unless a special properly listed and labeled UL approved system is specifically indicated.
   2. Provide for new 15 and 20 ampere branch circuit drops to outlets in existing hollow partitions for remodeling work. This applies only under all of the following circumstances and conditions.
      a. Basis of design includes cutting and patching for such applications. Type MC/AC cable may be used only where Owner or Architect specifically directs installer case-by-case not to slot walls (limited to 10 feet maximum cable length from overhead conduit system junction box to respective wall outlet box).
      b. Provide only where concealed (install wiring for exposed applications in raceway).
      c. Route cables perpendicular and parallel to the building architectural lines, surfaces, and structural members, keeping offsets to a minimum and following surface contours where possible. Maintain a uniform elevation for cable runs wherever possible. Support and anchor cables at maximum 4 foot intervals and within 12" of box or outlet in a manner that prevents sagging. Install cables in a manner that prevents overheating. Fasten cables directly to the structure using factory clamps and clips specifically designed for the respective cable (Caddy or equal).
      d. Provide only where installed for normal utility circuits. Install wiring for emergency system circuits in steel conduit, no exceptions.

2.05 PORTABLE CORD (IF REQUIRED)

A. Provide Type S Portable Cord. Provide with full parity sized insulated equipment ground conductor.

B. Only use Portable Cord for flexible pendant leads to outlets, to equipment where indicated, and only where permitted by NEC, by local authority having jurisdiction, and by engineer.

2.06 CONNECTORS FOR CONDUCTORS

A. Provide UL-listed factory-fabricated, solderless metal connectors of sizes, ampacity ratings, materials, types and classes for applications and for services indicated. Use connectors with temperature ratings equal to or greater than those of the wires upon which used.

2.07 CABLE JACKETS

A. Provide color-coded factory-applied heat and moisture resistant PVC compound with external heat and light stabilized nylon jacket, tightly applied.

PART 3 EXECUTION

3.01 INSTALLATION

A. Refer to respective Division 26 Section and to drawings.

B. Connect wires #6 AWG and larger to panels and apparatus by means of approved lugs or connectors large enough to enclose all strands of the conductors. Provide solderless type connectors.

C. Do not pull wire until raceways are complete, plastering is complete, and raceways are free of moisture. Install joints and splices only at NEC approved panels, accessible junction boxes, or accessible outlet boxes. Pull conductors simultaneously where more than one is being installed in same raceway. Use UL listed pulling compound or lubricant, where necessary to prevent damage to conductors. Use pulling means, including fish tape, cable, rope, and basket weave wire/cable grips that will not damage cables and raceways. Do not use rope hitches for pulling attachment to wire or cable. Conceal work in finished spaces.

D. Neatly dress work. Install work parallel and perpendicular to surfaces and exposed structural members, and follow surface contours where possible. Keep conductor splices to minimum. Install splice and tap connectors that possess equivalent, or better, mechanical strength and insulation rating than conductors being spliced. Use splice and tap connectors that are compatible with conductor material. Install wires continuous from outlet to outlet. Provide insulation value of joints at least 100 percent in excess of wire. Provide adequate length of conductors within electrical enclosures, and train the conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than #10 AWG cabled in individual circuits. Make terminations so there is no bare conductor at the terminal.

E. Provide factory splice kits (U.L. approved for submersion in water and direct burial) for wire splicing in outdoor grade, or slab on grade, junction boxes.

END OF SECTION

SECTION 26 0521

ELECTRICAL CONNECTIONS

PART 1 GENERAL

1.01 RELATED WORK

A. Electrical connections include connections used for providing electrical power, control and monitoring to equipment, luminaires and devices. Refer to sections of other Divisions and to drawings of other trades for specific for electrical characteristics of equipment specified under respective divisions.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, provide products equal to those manufactured by one of the following as applicable.
   1. Adalet-PLM Div, Scott and Fetzer Co.
   2. Allen-Stevens Conduit Fittings Corp.
   3. AMP Incorporated.
   4. Appleton Electric Co.
   5. Arrow-Hart Div, Crouse-Hinds Co.
   6. Atlas Technologies, Inc.
   7. Bishop Div, General Signal Corp.
   8. Burndy Corporation.
   9. Eagle Electric Mfg Co., Inc.
   10. Electroline Mfg Co.
   11. Gardner Bender, Inc.
   12. General Electric Co.
   13. Gould, Inc.
   14. Harvey Hubbell Inc.
   15. Ideal Industries, Inc.
   16. ILSCO.
   17. Pyle National Co.
   18. Reliable Electric Co.
   19. Square D Company.
   20. Thomas and Betts Corp.

2.02 MATERIALS AND COMPONENTS

A. Provide complete assembly of materials for each type of required electrical connection, including but not limited to, pressure connectors, terminals (lugs), electrical insulating tape, heat-shrinkable insulating tubing, cable ties, solderless wire-nuts, and other items and accessories as needed to complete splices and terminations of types indicated.

B. Unless otherwise indicated, provide wires/cables (conductors) for electrical connections that match, including sizes and ratings, of wires/cables that are supplying electrical power. Provide copper conductors with conductivity of not less than 98% at 90 degrees C.

C. Provide electrical connectors and terminals that mate and match, including sizes and ratings, with equipment terminals, and that are recommended by equipment manufacturer for intended applications.

D. Provide electrical insulating tape, heat-shrinkable insulating tubing and boots, wirenuts, cable ties, etc. as recommended for use by accessories manufacturers for intended applications.

PART 3 EXECUTION

3.01 INSTALLATION

A. Connect electrical power supply conductors to equipment conductors in accordance with equipment manufacturer's written instructions and wiring diagrams. Mate and match conductors of electrical connections for proper interface between electrical power supplies and installed equipment. Cover splices with electrical insulating material to achieve insulation at least 100 percent in excess of electrical insulation rating of those conductors being spliced. Prepare cables and wires, by cutting and stripping covering armor, jacket, and insulation properly to ensure uniform and neat appearance where cables and wires are terminated. Exercise care to avoid cutting through tapes which will remain on conductors. Do not "ring" copper conductors while skinning wire.

B. There may be cases where circuit or feeder conductor sizes are too large to fit into the lugs normally supplied with the end-use equipment, due to circumstances such as increasing conductor sizes to offset voltage drop. In such cases provide appropriate factory lug kits for affected equipment if recommended by manufacturer; elsewhere provide insulated butt-splices with tails sized to fit respective lugs.

C. Ground metal frames of portable and stationary direct-wired electrically operated equipment by connecting frames to the circuit equipment grounding conductor and to grounded metal raceway. Provide necessary electrical connections between the specified equipment and junction boxes, disconnect switches, and starters near equipment with flexible metallic conduit and matched connectors. Do not expose flexible conduit in finished areas.

D. Connect electrical equipment furnished under this branch of work, other branches of work and by the owner. Review documents of other trades to identify electrically operated/controlled equipment that is furnished or installed by the owner, or by other trades. Provide power connections and local disconnects for same. Provide control wiring (including relays, starters, etc.), as required to render equipment fully operable unless indicated otherwise on drawings or in project manual. Determine exact requirements in field from respective equipment installer.

END OF SECTION

SECTION 26 0526

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED WORK

A. This section includes grounding and bonding requirements for electrical and telecommunications systems, circuits, and equipment.

B. Provide the following minimum requirements for grounding.
   1. NFPA: - Components and installation shall comply with NFPA 70, “National Electrical Code” (NEC).
   2. UL - Comply with UL 467, “Grounding and Bonding Equipment.”
   3. ANSI/TIA/EIA-607, “Commercial Building Grounding and Bonding Requirements for Telecommunications.

1.02 DEFINITIONS

A. Electrical Ground Bar: A copper ground busbar, typically installed in each electrical room, and bonded to service entrance ground.

PART 2 PRODUCTS

2.01 MATERIALS

A. Subject to compliance with requirements, provide grounding and bonding product manufacturers of the installer's choice unless noted otherwise.

B. Except as otherwise indicated, provide copper electrical grounding and bonding systems and materials with assembly of materials including but not limited to cables/wires, connectors, solderless lug terminals, grounding electrodes and plate electrodes, bonding jumper braid, and additional accessories needed for a complete installation. Where materials or components are not indicated, provide products that comply with NEC, UL, and IEEE requirements, and with established industry standards for those applications indicated. Utilize compatible metallic materials throughout system to eliminate galvanic action.
   1. Provide Electrical Room Grounding Busbar with the following characteristics.
      a. Electro-tin plated ¼” thick copper bar
      b. Insulated stand-offs
      c. Hole pattern type “CC”
      d. 4 inches high x 18 inches wide
      e. Standard of quality shall be Erico Electrical Products EGBA14418CC.
      f. Additional approved manufacturers: Chatsworth, Storm Copper Components.

PART 3 EXECUTION

3.01 INSTALLATION

A. Terminate feeder and branch circuit insulated equipment grounding conductors with grounding lug, bus, or bushing. Route grounding connections and conductors to ground and protective devices in shortest and straightest paths as possible to minimize transient voltage rises.

B. Install clamp-on connectors on clean metal contact surfaces, to ensure electrical conductivity and circuit integrity.

C. Provide corrosion-resistant finish to field-connections, to places where factory applied protective coatings have been damaged, and where subject to corrosive action.

D. Route ground conductors used for bonding in protective conduit sleeves. Provide both ends of these conduit sleeves with ground bushings, and bond ground bushings to enclosures and ground terminations at both ends using jumpers. Size ground jumper conductors the same as the respective ground conductor that is being protected within the respective conduit.

E. Provide corrosion-resistant finish to buried metallic grounding and bonding products.

F. Terminate ground electrode conductors with two-hole compression lugs. Terminate bonding jumper conductors with one-hole compression lugs.

G. Install braided type bonding jumpers with ground clamps on valved water piping where such piping penetrates exterior walls and fire walls. Install water pipe connector fittings so that they make contact with the water pipe for a minimum distance of 1-1/2 inches (measured along the axis), and have a minimum contact surface area of 3 square inches.

H. Provide and test a complete earthing (earth ground) system for the entire electrical and telecommunications infrastructure.

I. Equalize (bond together) ground potentials associated with the electrical distribution system, separately derived systems, steel structural systems, and water services per NEC and as applicable.

J. Separately Derived System Grounding Requirements
   1. Ground and bond each separately-derived system neutral to room ground busbar, to effectively grounded structural steel member, to effectively grounded metallic water pipe, and to separate grounding electrode system as required per National Electrical Code and as applicable.
   2. Provide an enclosed single ground busbar at derived electrical system locations, bonded to the enclosure, and bonded to derived system ground with full parity sized green insulated ground conductor (sized same as derived system ground conductor). Provide quantity and sizes of lugs on these busbars as required to accommodate bonding to derived system ground and other grounding requirements set forth in project manual and in NEC. Provide UL listed lugs for use with copper and aluminum conductors.

END OF SECTION

SECTION 26 0529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED WORK

A. Supervise the installation of and provide additional members, wood, and metal required to support permanent and temporary electrical apparatus. Provide required supports, anchors, sleeves, and seals (factory or field installed as applicable).

PART 2 PRODUCTS

2.01 MATERIALS

A. Provide manufacturer’s materials of the installer's choice as applicable.

B. Provide supporting devices that comply with manufacturer’s standard materials, design, and construction in accordance with published product information, and as required for complete installation.

C. Provide cable supports with galvanized steel body, and with insulating wedging plug for non-armored type electrical cables in risers.

D. Provide U-channel strut systems for supporting electrical equipment that are 12-gage hot-dip galvanized steel, of types and sizes required for complete installation for respective applications. Provide strut with 9/16 inch diameter holes and 8" O.C. top surfaces, with standard factory finish and with necessary fittings that mate and match with U-channel.

E. Provide the following as applicable and as required to install work in a proper manner.
1. Clevis hangers for supporting rigid metal conduit; galvanized steel; with 1/2 inch diameter hole for round steel rod.
2. Riser clamps for supporting rigid metal conduit; galvanized steel; with 2 bolts and nuts, and 4 inch ears.
3. Galvanized steel rod reducing couplings, 1/2 inch x 5/8 inch.
4. Galvanized steel clamps; 1/2 inch rod size.
5. Galvanized steel clamps, 1-1/4 inch x 3/16 inch stock; 3/8 inch cross bolt; 2 inch flange width.
6. One-hole conduit straps for supporting 3/4 inch rigid metal conduit; galvanized steel.
7. Two-hole conduit straps for supporting 3/4 inch rigid metal conduit, galvanized steel; 3/4 inch strap width; and 2-1/8 inches between center of screw holes.
8. Hexagon nuts for 1/2 inch rod size; galvanized steel.
9. Galvanized steel rods; 1/2 inch diameter.
10. Offset conduit clamps for supporting rigid metal conduit; galvanized steel.
11. Lead expansion anchors, 1/2 inch.
12. Springhead galvanized steel toggle bolts; 3/16 inch x 4 inch.

PART 3 EXECUTION

3.01 INSTALLATION

A. Support electrical work directly from building structural members. Do not support electrical work from ductwork, ductwork hangers, ceiling supports, existing conduit supports, etc.

B. Route conduits, raceways and cables (where applicable) parallel and perpendicular to building structural members.

C. Provide hangers, supports, clamps and attachments to support work properly from building structure. Arrange for grouping of parallel runs of horizontal conduits to be

supported together on trapeze type hangers where possible. Install supports with spacings indicated and in compliance with NEC requirements.

D. Cut, fit, and place miscellaneous metal fabrications accurately in location, alignment, and elevation to support and anchor electrical materials and equipment. Comply with AWS "Structural Welding Code" for field welding.

E. Provide stem lengths for pendant luminaires as directed by the owner's representative.

F. Submit methods and materials proposed for hanging exposed work to the owner's representative for review before installation. Provide fasteners that are zinc-coated with type, grade, and class as required for a neat installation.

G. Plywood Equipment Boards
   1. Provide Standard Grade light-framing-size lumber of any species for general wood supports and anchorage, which are Number 3 Common or Standard Grade boards complying with WCLIB or AWPA rules, or Number 3 boards complying with SPIB rules. Provide lumber that is preservative treated in accordance with AWPB LP-2, and kiln dried to a moisture content of not more than 19 percent. Provide marine grade products where subject to moisture conditions. Provide Ackerman-Johnson (or equal) expansion screw anchors. Cut, fit, and place wood grounds, nailers, blocking, and anchorage accurately in location, alignment, and elevation to support and anchor electrical materials and equipment. Provide fastener sizes that will not penetrate members where opposite side will be exposed to view, or will receive finish materials. Provide tight connections between members. Install fasteners without splitting wood members. Attach to substrates as required to support applied loads
   2. Unless directed otherwise in field, plywood equipment boards shall be 8 feet high by 3/4 inches deep by width shown on drawings (as dimensioned or as scaled) or width as required to accommodate equipment.
   3. Provide plywood equipment boards at locations shown on drawings. Where not shown on drawings, and in addition to those shown on drawings where applicable, provide plywood equipment boards for surface mounted panelboards and systems "head-end" equipment for applications where located in unfinished rooms. Elsewhere only provide them where specifically shown on drawings.
   4. Provide lumber that is preservative treated in accordance with AWPB LP-2, and kiln dried to a moisture content of not more than 19 percent. Provide APA C-D PLUGGED INT plywood equipment boards with exterior glue. Provide marine grade plywood where subject to moisture conditions.
   5. Provide Ackerman-Johnson (or equal) expansion screw anchors. Unless otherwise noted, paint boards with two coats of good grade weatherproof flat gray non-conductive fire-retardant paint on all sides and edges (prior to mounting). Install boards plumbed in a true vertical position. Provide nominal 1/2" rustproof spacers between back of plywood and wall for applications located on below-grade building foundation walls.
   6. Cut, fit, and place plywood equipment boards accurately in location, alignment, and elevation to support and anchor electrical materials and equipment. Provide fastener sizes that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Provide tight connections between members. Install fasteners without splitting wood members. Attach to substrates as required to support applied loads. Maintain at least 4 inches between bottom of plywood equipment boards and finished floor surfaces.

H. Concrete Bases / Housekeeping Pads
   1. Provide concrete bases/housekeeping pads beneath electrical power and systems distribution equipment that is floor mounted or wall mounted within 4" of the floor. Extend the pads at least 4" beyond the bed or frame of the supported equipment.

2. Provide indoor bases that are at least 4" thick, that have straight and finished sides, and that have 1 inch 45-degree chamfer at the top perimeter. Provide reinforcing steel bars in both directions of the bases. Provide lateral support work to adjacent walls where required for supplemental support.

END OF SECTION

SECTION 26 0533

RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED SECTIONS

A. Refer to Section 26 00 02 for raceway related identification requirements.

1.02 RELATED WORK

A. Install wire in raceway/conduit (sized per NEC, minimum 3/4“) unless specifically permitted otherwise elsewhere in Division 26 sections, or on drawings.

B. Install wiring for different power voltages in raceway systems separate from each other (i.e. 24V separate from 208Y/120V, separate from 480Y/277V, etc.).

C. Install wiring, with the exception of voice and data, for the various electrical systems in raceway systems, which are separate from each other (i.e. fire alarm separate from voice/data separate from etc.).

D. Install normal system power wiring, emergency system wiring and standby system wiring all in separate raceways from each other.

E. Do not install conduits within slabs unless specifically noted on drawings, or unless part of an underfloor duct raceway system.

F. Do not install conduits beneath slabs on grade, except if where specifically indicated otherwise on drawings, or unless special case by case permission is obtained from owner’s representative in the field.

G. Provide steel conduit and steel fittings for indoor above-slab applications, as specified in this section.

H. Provide conduit fittings with insulated throats, or plastic bushings for conduits 2" and larger where insulated throats are not readily available.

I. Provide pullboxes for conduit runs exceeding 100 feet in length, or having in excess of 270 degrees of offset.

J. Provide maximum of 40 percent fill for raceways, or a threshold of less if required by NEC.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide products manufactured by Steel City, T&B, Regal, Efcor, Wheatland, Allied, LTV, Carlon, Cantex or Walker/Wiremold as applicable.

2.02 ELECTRICAL METALLIC TUBING (EMT)

A. Provide galvanized or zinc coated steel EMT compliant with FS WW-C-563, ANSI C80.3 and UL 797.

B. Provide galvanized or zinc coated steel compression fittings, concrete-tight. Do not use die-cast fittings.

C. Provide EMT for above-grade conduit, except where indicated otherwise herein, under other Division 26 sections, or on drawings.

2.03 STEEL RIGID METAL CONDUIT (RMC)

A. Provide rigid steel, heavy wall, full weight, zinc-coated, threaded type (galvanized after cutting/threading) conduit conforming to ANSI C80.1 and UL 6. Provide zinc coating fused to inside and outside walls of conduit.

B. Provide galvanized or zinc coated steel threaded fittings.

C. Provide for the following applications.
   1. Conduit installed embedded in concrete, or masonry.
   2. Conduits (grounded) that turn up from below grade or below slab, excluding the 90 degree fittings that connect to horizontal conduits below grade or slab.
   3. Other applications as indicated in project manual or on drawings, as required by NEC, or as otherwise required for special physical protection (i.e. nearby vehicular/equipment traffic, site maintenance equipment, etc.).

2.04 FLEXIBLE METAL CONDUIT

A. Provide flexible metal conduit compliant with FS WW-C-566 and UL 1, and formed from continuous length of spirally wound, interlocked zinc-coated or galvanized (inside & outside) strip steel. Provide conduit fittings for use with flexible steel conduit of threadless hinged clamp type, with insulated throats. Provide Straight Terminal Connectors consisting of one piece body, female end with clamp and deep slotted machine screw for securing conduit, and male threaded end with locknut. Do not use 45 degree or 90 degree Terminal Angle Connectors for flexible or water-tight flexible metal conduit in locations that will not be fully accessible after completion of construction. Provide full size green insulated ground wire for all applications, regardless of length. Provide flexible metal conduit for the following conditions as applicable.
   1. Provide for final 72 inches from outlet/junction boxes to recessed luminaires that are located in accessible ceiling systems. Optionally, Type AC/MC cable may be used for "fixture whips" (refer to Section 26 05 19).
   2. Provide for final 24-72 inches of connection to indoor equipment that is subject to movement or vibration. Leave sufficient slack in flexible conduit to permit movement from vibration without adversely affecting conduits and connections.

2.05 LIQUID-TIGHT FLEXIBLE METAL CONDUIT

A. Provide flexible metal conduit compliant with FS WW-C-566 and UL 1, and formed from continuous length of spirally wound, interlocked zinc-coated or galvanized (inside & outside) strip steel. Provide conduit fittings for use with flexible steel conduit of threadless hinged clamp type, with insulated throats. Provide Straight Terminal Connectors consisting of one piece body, female end with clamp and deep slotted machine screw for securing conduit, and male threaded end with locknut. Do not use 45 degree or 90 degree Terminal Angle Connectors for flexible or water-tight flexible metal conduit in locations that will not be fully accessible after completion of construction. Provide full size green insulated ground wire for all applications, regardless of length. Provide flexible metal conduit for the conditions as applicable.

B. Provide liquid-tight flexible metal conduit constructed of single strip that is flexible, continuous, interlocked, double-wrapped steel, and galvanized (inside and outside). Provide liquid-tight jacket of flexible polyvinyl chloride (PVC). Provide smooth-wall type jackets (not a corrugated look) for finished area furniture whip (and similar) applications. Provide Liquid-Tight Flexible Metal Conduit Fittings compliant with FS W-F-406, Type 1, Class 3, Style G. Provide cadmium plated, malleable iron fittings with compression type steel ferrule and neoprene gasket sealing rings, with insulated throat. Provide Straight Terminal Connectors that are one piece body, female end with clamp and deep slotted machine screw for securing conduit, and male threaded end with locknut. Provide Terminal Angle Connectors that are 45 degree or 90 degree two-piece body construction with removable upper section, female end with clamp and deep slotted machine screw for

securing conduit, and male threaded end provided with locknut. Do not use 45 degree or 90 degree Terminal Angle Connectors for flexible or water-tight flexible metal conduit in locations that will not be fully accessible after completion of construction. Provide full size green insulated ground wire for all applications, regardless of length. Provide liquid-tight flexible metal conduit for the following conditions as applicable.

1. Provide for connections from wall outlet boxes/raceways to systems furniture.
2. Provide for final 24-72 inches of connection to outdoor equipment (including within outdoor enclosures) that is subject to movement or vibration and/or that may be subject to corrosion. Leave sufficient slack in flexible conduit to permit movement from vibration without adversely affecting conduits and connections.
3. Provide for final 24-72 inches of connection to indoor equipment that is subject to movement or vibration, where subject to corrosion. Leave sufficient slack in flexible conduit to permit movement from vibration without adversely affecting conduits and connections.

2.06 WIREWAYS

A. Provide electrical wireways of types, grades, sizes, and number of channels for each type of applicable service. Provide complete assembly of raceway including, but not limited to, couplings, offsets, elbows, expansion joints, adapters, hold down straps, end caps, and other components and accessories as required for complete system.

B. Provide lay-in wireways with hinged covers in accordance with UL 870, and with components UL-listed, including lengths, connectors, and fittings. Provide units that allow fastening of hinged cover closed without use of parts other than standard lengths, fittings and connectors. Provide units capable of sealing cover in closed position with sealing wire. Provide wireways with knockouts.

C. Provide wireway connectors suitable for "lay-in" conductors, with connector covers permanently attached so that removal is not necessary to utilize the lay-in feature. Provide NEMA 3R units where used outdoors or in areas subject to moisture.

D. Protect sheet metal parts with rust inhibiting coating and baked enamel finish. Provide plate-finished hardware to prevent corrosion. Protect screws installed toward inside of wireway, with spring nuts to prevent wire insulation damage.

2.07 CONNECTORS, FITTINGS AND CONDUIT BODIES

A. Provide conduit fittings with insulated throats, or plastic bushings for conduits 2" and larger where insulated throats may not be not readily available.

B. Provide locknuts for securing conduit to metal enclosure with sharp edge for digging into metal, and ridged outside circumference for proper fastening. Provide screw type grounding terminal for metal bushings of standard or insulated type.

C. Provide miscellaneous fittings such as reducers, chase nipples, 3-piece unions, split couplings, and plugs that are specifically designed for their particular application.

D. Provide expansion fittings and appropriate couplings in raceways wherever structural expansion joints are crossed, wherever deflection is expected, and as otherwise required to accommodate similar movement. Provide expansion fittings with ground bonding jumpers that are long enough to accommodate respective expansions and movement.

E. Provide galvanized cast-metal (steel) conduit bodies of types, shapes and sizes as required to fulfill job requirements and NEC requirements. Construct conduit bodies with threaded-conduit-entrance ends, with removable covers, either cast or of galvanized steel, and with corrosion-resistant screws.

2.08 RIGID NONMETALLIC CONDUIT AND DUCTS

A. Provide electrical plastic conduits/ducts for applications below grade and below slab, and for special conditions if so noted on drawings or in other Division 26 sections.

B. Provide electrical plastic conduit equal to Carlon Plus 40, Heavy Wall EPC Type EB-35. Provide heavy wall electrical plastic conduit that is Schedule 40, 90 degrees C rated, constructed of polyvinyl chloride, in conformity with NEMA TC-2, in conformity with NEC Article 354, and is UL listed and labeled for direct burial, concrete encasement, and above ground use.

C. Provide conduit/duct accessories of types, sizes, and materials, complying with manufacturer's published product information, which mate and match conduit and tubing.

D. Provide Duct Spacers ("chairs") equal to Carlon #S288*L series for base spacers, and #S289*L series for intermediate spacers.

E. Provide horizontal elbows for service entrance conduits that are maximum 45 degree. Provide minimum 24 inch radius. Provide larger minimum radius where indicated on drawings, or if directed in field. Provide multiple units as necessary to obtain required offset (i.e. provide two 45 degree elbows to obtain a 90 degree offset where needed). Provide 90 degree maximum elbows.

F. Provide couplers, adapters, "O" rings, sealing, and other accessory components as required for a complete installation. Provide miscellaneous fittings that have been specifically designed and manufactured for their particular application.

PART 3 EXECUTION

A. General

1. Provide conduit, tubing and fittings of types, grades, sizes and weights (wall thicknesses) for applications as needed to render electrical work fully operational.
2. Mechanically fasten together metal conduits, enclosures, and raceways to form continuous electrically conducting equipment grounding path. Connect to electrical boxes, fittings and cabinets to provide electrical continuity and firm mechanical assembly. Conduit shall be continuous between outlets to make a complete installation and to effect a continuous ground.
3. Avoid using dissimilar metals throughout the systems to eliminate possibility of electrolysis. Where dissimilar metals will be unavoidably in contact, coat surfaces with corrosion inhibiting compound before assembling.
4. Provide miscellaneous fittings such as reducers, chase nipples, 3-piece unions, split couplings, and plugs that have been specifically designed and manufactured for their particular application.
5. Use rough-in dimensions of electrically operated equipment furnished by equipment installer. Install conduit and boxes for connection to equipment only after reviewing respective equipment and clearance dimensions, and after coordinating with other trades.
6. Properly support and anchor raceways for their entire length using structural materials. Do not span any space unsupported.
7. Do not use electrical "handee" boxes with surface raceway installations.
8. Level and square raceway runs, and install at proper elevations and heights. Wherever possible, install horizontal raceway runs above liquid and steam piping.
9. Cut conduits straight, properly ream, and cut threads for heavy wall conduit deep and clean. Field-bend conduits with benders designed for purpose so as not to distort, nor vary, internal diameters.
10. Fasten conduit terminations in sheet metal enclosures with two locknuts. Install locknuts inside and outside enclosure.

11. Do not cross shafts, or ventilating duct openings, with raceways. Keep raceways a minimum distance of 12" from parallel runs of flues, hot water pipes or other sources of heat. Support risers at each floor level with suitable hangers.
12. Do not use running threads at conduit joints and terminations - use 3-piece union, or split coupling.
13. Complete installation of electrical raceways before starting installation of cables/wires within raceways. Clean inside of conduit before wiring is pulled. Cap and plug conduit ends with standard accessories as soon as conduit has been permanently installed.
14. Provide heavy nylon pull-cord/drag-line (200 pound minimum strength) in conduits installed without conductors.
15. Provide joints made tight with water-tight couplings matching conduit. Install corners with long radius sweep bends, except conduit sizes 1 inch and over where standard elbows may be used.
16. Cut ends of conduits square and ream. Bring joints to a shoulder. Provide suitable supports and fasteners for conduit. Install exposed conduit parallel to walls, and plumb on walls. Secure to walls and ceiling with pipe straps at intervals not exceeding six feet. Support conduit by approved straps, fasteners and hangers. Provide hangers suspended from rods. Do not use perforated strap.
17. Provide fasteners that are lead expansion shields in block and concrete, toggle bolts in hollow walls, machine screws on metal surfaces, and wood screws on wood construction.
18. Provide sleeves in member for conduits passing through structural members.
19. Where moisture conditions are encountered, drill a hole at the lowest point in the conduit run so that drainage will not interfere with conditions below.
20. Where conduit is capped at wall for future additions, do not extend more than threads-length past wall (maximum of 3/4 inch past wall for EMT).
21. Install exposed conduits and extensions from concealed conduit systems neatly, parallel with, or at right angles to, walls of building.
22. Install exposed conduit work so there is no interference with ceiling inserts, lights, or ventilation ducts or outlets.
23. Install conduits for outlets on waterproof walls exposed. Set anchors for supporting conduit on waterproof wall in waterproof cement.
24. Requirements for exposed conduits also apply to conduits installed in space above hung ceilings, and in crawl spaces.
25. Provide a 4 inch reinforced casing of concrete (3000-PSI minimum) around conduits that are installed in cinders or cinder concrete, to protect them.
26. Install raceways concealed, except in electrical and mechanical type rooms where raceways may be exposed.
27. Where raceways must be exposed in finished areas install them in a manner that minimizes detrimental effects on room aesthetics. Review all proposed installation methods and routing for each application with the Architect and Owner prior to installation. Install so raceways are as out of site as reasonably possible. For instance, where applicable and if so directed by the Architect or the Owner, make drops near corners, window casings, door casings, etc. Likewise if a receptacle needs to be installed at the center of a wall, install the raceway down the wall in a corner of the room then transition and run horizontally to the outlet location if so directed by the Architect or the Owner. Utilize compression fittings and one-hole straps for EMT applications in these areas

3.02 CONCEALED CONDUITS BELOW SLAB OR GRADE

A. Installation
1. Provide underground ducts/conduits at minimum of 24" below grade, securely mounted on chairs when banked, with base in newly disturbed earth. Properly align ducts on chairs before backfilling. Provide heavy nylon pull-cord/drag-line (200 pound minimum strength) in empty conduits.

2. Provide grounded steel rigid metal conduit (full weight, heavy wall) for conduits that turn up from below grade or below slab, excluding the 90 degree fittings that connect to horizontal conduits below grade or slab.
3. Make changes in direction of raceway run with proper fittings that match raceway manufacturer.
4. Properly support and anchor raceways for their entire length with factory bases and intermediate spacers. Provide spacers at each coupling location, at each termination location, and at maximum five foot intervals between. Do not span any space unsupported. Provide end bells with rounded pulling surfaces at manholes, pull boxes and other end points of underground raceways.
5. Apply corrosion inhibiting compound before couplings are assembled for applications where metallic raceways are installed underground, in floors below grade, or outside. Draw up couplings and conduits sufficiently tight to ensure water-tightness. Provide steel rigid metallic conduit for applications where metallic conduits are installed below grade or slab.
6. Extend underground conduits that are capped at wall for future additions five feet beyond building.
7. Arrange excavation for exterior conduits so that:
   a. The lines are straight and true;
   b. Grades required for drainage are maintained;
   c. The tops of buried raceways are not less than 24" below finished grade.
8. Seal PVC joints with Carlon Cement. Make solvent cemented joints in accordance with recommendations of manufacturer.
9. Install work in accordance with NEC and in compliance with local utility practices.
10. Provide full parity size green insulated ground wire in PVC runs, except for those used exclusively for optical fiber cables.
11. Do not field bend raceway sections, unless required radius exceeds that available from manufacturer. Where field bends can not be avoided, use factory kit to perform the bends and follow factory instructions.

B. Encasement
1. Refer to Drawing details and Section 26 05 08 for further information related to encasement for underground conduits.

END OF SECTION

SECTION 26 0534

BOXES AND FITTINGS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED SECTIONS

A. Refer to Section 26 05 33 for further requirements regarding fittings, bushings, and similar accessories.

1.02 RELATED WORK

A. Types of electrical boxes and fittings specified in this section include the following:
   1. Outlet boxes.
   2. Junction boxes.
   3. Pull boxes.
   4. Bushings.
   5. Locknuts.
   6. Knockout closures.

PART 2 PRODUCTS

2.01 INDOOR BOXES

A. Provide galvanized-coated flat rolled code-gage non-gangable sheet-steel outlet/junction/pull boxes, of shapes, cubic inch capacities, and sizes, including box depths as indicated, suitable for installation at respective locations.

B. Construct outlet boxes with mounting holes and with cable and conduit-size knockout openings in bottom and sides where applicable. Provide boxes with threaded screw holes, with corrosion-resistant cover and grounding screws for fastening surface and device type box covers, and for equipment type grounding.

C. Provide minimum size of 4 inches square by 1-1/2 inches deep for outlet boxes and junction boxes. Provide outlet box accessories as required for each installation, including box supports, mounting ears and brackets, wallboard hangers, box extension rings, fixture studs, cable clamps, and metal straps for supporting outlet boxes, which are compatible with outlet boxes being used to fulfill installation requirements for individual wiring situations. Provide with stainless steel nuts, bolts, screws and washers.

D. Subject to compliance with requirements, provide interior outlet boxes equal to products offered by one the following.
   1. Adalet.
   2. Appleton Electric.
   3. Bell Electric.
   4. Bowers.
   5. Eagle Electric Mfg Co., Inc.
   6. Midland-Ross Corp.
   7. OZ/Gedney.
   8. Pass and Seymour, Inc.
   9. RACO.
   10. Hubbell.
   11. Thomas & Betts Co.
   12. Thepitt.

2.02 FIRE WALLS, FIRE BARRIERS, SMOKE BARRIER WALLS AND FIRE PARTITIONS

A. Steel outlet boxes that do not exceed 16 square inches in area may be used in fire walls, fire barriers, smoke barrier walls, and fire partitions only if the total area of such openings does not exceed 100 square inches for any 100 square feet of wall area.

B. Provide a minimum of 24 inches of separation between outlet boxes on opposite sides of a common wall.

C. Provide outlet boxes, equipment back-boxes, etc. in fire walls, fire barriers, smoke barrier walls, and fire partitions that are of the type tested for use in fire-resistance-rated assemblies. Install in accordance with the tested assembly, and with the instructions included in the listing.

2.03 BUSHINGS, KNOCKOUT CLOSURES AND LOCKNUTS

A. Provide corrosion-resistant box knockout closures, conduit locknuts and malleable iron conduit bushings, offset connectors, of types and sizes, to suit respective installation requirements and applications.

PART 3 EXECUTION

3.01 INSTALLATION

A. Do not use access doors unless special prior written permission is granted from the owner' representative. Install pull boxes, junction boxes, etc. in areas which are accessible after construction. Do not install pull boxes or junction boxes above gypsum board, plaster or similar ceiling systems, nor above ductwork or equipment that renders them inaccessible.

B. Provide knockout closures to cap unused knockout holes where blanks have been removed.

C. Install electrical boxes in those locations that ensure accessibility to enclosed electrical wiring.

D. Do not install boxes back-to-back in walls. Provide not less than 6" (150 mm) separation in general, not less than 16” separation for acoustically rated walls and not less than 24" separation for the following applications: fire walls, fire barriers, smoke barrier walls, and fire partitions. Where outlet boxes are shown back-to-back on common walls, offset accordingly when installed.

E. Where outlet boxes occur in block, cinder or concrete block, facing tile or other material where such materials form the finished wall surface, neatly cut the opening for the box so that standard size (not "midway" or "jumbo") cover plates will cover all parts of the opening.

F. Do not install aluminum products in concrete.

G. Position recessed outlet boxes accurately to allow for surface finish thickness. Do not use round boxes.

H. Fasten electrical boxes firmly and rigidly to substrates and structural surfaces to which attached, or solidly embed electrical boxes in concrete or masonry as applicable. Provide box supports that are independent of conduit. Refer to Section 26 05 29 for further supporting requirements. Protect boxes from construction debris and damage subsequent to installation of boxes.

I. Consider the outlet, junction, and pull box locations indicated on drawings approximate. Study the general construction with relation to spaces and equipment surrounding each outlet, and neatly install outlets accordingly.

J. Record junction and pull boxes on record drawings. Permanently mark and label (using methods approved by owner's representative) junction/pullboxes as to which types of electrical services are within. Refer to Section 26 00 02 for further related requirements.

END OF SECTION

SECTION 26 0580

MECHANICAL EQUIPMENT

PART 1 GENERAL

1.01 RELATED WORK

A. Provide all necessary electrically related work as required to render all mechanical equipment (including plumbing, heating, ventilating and air conditioning equipment) fully operational and fully compliant with NEC. This includes, prior to ordering materials or commencing with rough-in, reviewing equipment submittal data and coordinating with installing contractors to ensure the correct size, rating and quantity of conductors are provided.

B. In the event that aluminum wiring is permitted for the project, provide the following supplemental work for electrical equipment connections regardless of who furnishes the equipment.
   1. Review equipment submittals, installation documents and nameplates to determine if there are any warranty or UL limitations regarding copper versus aluminum wiring connections at equipment.
   2. If there are any limitations, provide local non-fused disconnect at or near equipment (external to the equipment) and terminate aluminum conductors to the line side terminals of the disconnect switch. Provide copper conductors from load side terminals of the disconnect switch to the respective equipment factory disconnect or terminals as applicable.
   3. Coordinate all related work with all affected installers.

PART 2 PRODUCTS

2.01 REFER TO APPLICABLE DIVISION 26 SECTIONS.

PART 3 EXECUTION

3.01 INSTALLATION

A. General
   1. Drawn locations of equipment and devices are shown only for schematic indication of wiring requirements. Coordinate with locations and rough-in requirements as required to determine actual locations and termination requirements. Refer to all contract documents for additional electrical requirements and concerns, and for further representation of this work.
   2. Provide raceway, wiring, connections, and terminations for power and interlocks for electrically operated equipment. Provide starters and disconnect switches for mechanical equipment unless specifically indicated otherwise herein or on the drawings.
   3. Provide disconnect switch ahead of all equipment, including controls, unless the mechanical equipment comes with integral NEC-compliant disconnect(s). Provide NEMA 3R enclosures where installed outdoors and where installed indoors in areas subject to moisture. Ground metal frames of equipment by connecting frames to the grounded metal raceway or to a full size green ground conductor or both. Provide the necessary electrical connections between the specified equipment and the junction box near equipment with flexible metallic conduit (liquid-tight outdoors) and matched connectors (see Section 26 05 33). Where mechanical equipment lugs cannot accommodate conductor sizes shown on drawings, provide ILSCO ClearTap Insulated Multi-Tap Connectors.
   4. Sizes, electrical ratings, etc. of equipment and wiring shown on drawings are based on the respective equipment design base manufacturers. If different manufacturer(s) or model(s) are actually supplied, provide necessary coordination

in field (prior to ordering materials and prior to rough-in) and provide the necessary size of related electrical equipment, wiring, conduit, etc.

5. Prior to furnishing submittals and prior to rough-in, determine exact electrically related characteristics, loads, voltages, disconnect and starter requirements, locations, mounting heights, connection points, etc. of mechanical equipment.

B. HACR Breakers

1. Coordinate in field with the respective trades and determine case by case, which equipment is factory listed for use with Heating and Air Conditioning Rated (HACR) breakers. In an effort to minimize requirements for stocking of fuses by the owner, utilize HACR breakers at the source panelboards as the NEC required overcurrent protection wherever possible (in lieu of fusing local disconnect switches).

C. Disconnect Switch and Starter Locations

1. Locations of disconnects and starters shown on drawings are indicated for schematic purposes only. Determine exact locations in field so that they are compliant with NEC Article 110 requirements for panelboards.

D. Plumbing Equipment

1. Refer to Plumbing / Electrical Coordination Schedule on drawings. Provide disconnects, starters, accessories, wiring, etc. as defined as “EC” in the schedule.

2. Air Compressors
   a. Provide power, wiring, and connections.
   b. Provide combination H.O.A. starter at the unit.

END OF SECTION

SECTION 26 2201

LOW-VOLTAGE TRANSFORMERS

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Types of transformers specified in this section include dry-type Low Voltage Distribution Transformers (600 Volts and Less).

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, provide products of one of the following (for each type of transformer).
   1. General Electric Co.
   2. Hevi-Duty Electric.
   3. Siemens/ITE.
   4. Square D Co.
   5. Eaton.

2.02 MATERIALS

A. Dry-Type Transformers for General Lighting and Distribution
   1. Provide transformers equal to Square D Company.
   2. Except as otherwise indicated, provide manufacturer's standard materials and components as indicated by published product information, designed and constructed as recommended by manufacturer, and as required for complete installation.
   3. Provide transformer insulating materials that are in accordance with NEMA ST20 Standards for 220 degrees C., UL component recognized insulation system. Manufacturer and test transformers in accordance with ANSI Standards C57.12.01 and C57.12.91.
   4. Provide transformers that are UL Listed and Labeled for their specific use.
   5. Provide transformers rated for continuous operation at listed kVA.
   6. Provide factory-assembled, general-purpose, air-cooled, dry-type distribution transformers where shown of sizes, characteristics, and rated capacities indicated. Provide transformers rated at 60-hertz with 480-volts delta connection primary and 208/120 volts secondary wye connections. Provide minimum of four 2-1/2% full capacity primary taps.
   7. Provide transformers with UL recognized 220 degrees C insulation system. Limit transformer coil surface temperature rise to maximum of 150 degrees C above 40 degrees C ambient. Provide transformers with primary and secondary temperatures that do not exceed 220 degrees C at any point in the coils while carrying their full rating of non-sinusoidal load. Provide transformers with hot spot temperatures that do not exceed 220 degrees C at K-factor rating of 13.0. Limit transformer enclosure surface temperature rise to maximum of 50o C. above 40o C. ambient.
   8. Provide transformers with 10 kV minimum BIL ratings
   9. Provide terminal enclosure, with cover, to accommodate primary and secondary coil wiring connections, and to accommodate electrical supply raceway terminal connectors. Provide terminal leads with connectors installed. Provide wiring connectors suitable for copper or aluminum wiring. Cushion-mount transformers with external vibration isolation supports. Provide sound-level ratings that do not exceed the following values as determined in accordance with ANSI/NEMA standards:

15 to 50 kVA - 45 dB.
51 to 150 kVA - 50 dB.
151 to 300 kVA - 55 dB.
301 to 500 kVA - 60 dB.
501 to 700 kVA - 62 dB.
701 to 1000 kVA - 64 dB.
1001 to 1500 kVA - 65 dB.
1501 to 2000 kVA - 66 dB.

10. Electrically ground core and coils to transformer enclosure by means of flexible metal grounding strap. Provide transformers with fully enclosed ventilated sheet steel enclosures. Apply manufacturer's standard light gray indoor enamel over cleaned and phosphatized steel enclosure. Provide transformers suitable for wall mounting where applicable. Coat interior and exterior surfaces of transformer, including bolted joints, with manufacturer's standard color baked-on enamel.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install units on vibration mounts; comply with manufacturer's indicated installation method. Provide 4" elevated concrete housekeeping pad for each floor mounted transformer. Provide transformers in strict compliance with NEC Article 450.

B. Transformer locations shown on drawings are shown approximately to scale. Provide final coordination between affected trades (prior to rough-in) so that code required, and factory recommended, ventilation and working clearances around transformer installations are maintained.

C. Provide final connections with an accurate torque wrench, and tighten to factory published torque values, and submit written documentation showing factory recommendations and actual values.

D. Provide final connections to primary and secondary taps as necessary to fulfill project voltage requirements.

E. Vacuum and wipe down transformer, enclosure interior and enclosure exterior. From the time of manufacture, through shipping/storage phases, keep transformers dry, free of condensation, and free of rapid temperature fluctuations. Do not store transformers outdoors. Maintain transformers at temperatures above ambient while in storage.

F. Provide factory wall and ceiling mounting brackets where transformers are required to be wall mounted or mounted overhead, and install as recommended by transformer manufacturer. Also provide companion factory vibration isolators. Locations for such transformers are shown for schematic purposes. Determine exact location in field based on surrounding building conditions, work of other trades, factory recommendations, ventilation requirements, maintenance access, and requirements of the National Electrical Code (including working clearance requirements). Submit specific proposed installation methods, sketches and details to architect and structural engineer for review and comment prior to commencing with any related work.

3.02 TESTING

A. Provide testing, and keep written and dated log, for the following.
1. “Hi-Pot” or "Megger", at factory at time of shipping.
2. "Megger", at job site, immediately prior to final connections.
3. Phase rotation and turns ratio, at factory at time of shipping.
4. Phase rotation and turns ratio, at job site, immediately prior to final connections.
5. Secondary voltage under no load, after installation.
6. Secondary voltage under full load, after installation.

B. Upon completion of installation of transformers, energize primary circuitry at rated voltage and frequency from normal power source. Then provide transformers testing including audible sound levels to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units or components, and proceed with retesting.

END OF SECTION

SECTION 26 2416

PANELBOARDS

PART 1 GENERAL

1.01 RELATED WORK

A. Types of panelboards and enclosures required for the project include the following.
   1. Power-distribution panelboards.
   2. General use panelboards.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, provide panelboard products of one of the following (for each type and rating of panelboard and enclosure):
   1. Square D Company.
   2. General Electric Company.
   3. Siemens/ITE.
   4. Eaton.

2.02 GENERAL REQUIREMENTS

A. Except as otherwise indicated, provide panelboards, enclosures and ancillary components, of types, sizes, and ratings indicated, which comply with manufacturer's standard materials; with the design and construction in accordance with published product information.

B. Provide panelboards with proper number of unit panelboard devices as required for complete installation. Where types, sizes, or ratings are not indicated, comply with NEC, UL and established industry standards for those applications indicated.

C. Provide panelboards that are new and manufacturer's latest standard catalog design.

D. Provide panelboards that bear UL labels for their specific applications.

E. Provide panelboards suitable for service voltage with number of branch circuits of capacity scheduled.

F. Provide panelboards, and sections thereof if applicable, with main-lugs-only of capacity equal to, or greater than, the rating or setting of the overcurrent protective device next back on the line.

G. Provide panelboard branches as scheduled on the drawings.

H. Provide circuit breaker panelboard bus assemblies with distributed (sequence) type bussing throughout, so that any two adjacent single-pole breakers, or spaces, are replaceable by a two-pole internal common trip breaker, and so that any three adjacent single-pole breakers, or spaces, are replaceable by a three-pole internal common trip breaker. This applies for branch breakers sized 15 amp through 70 amp inclusive, without disturbing any other breaker.

I. Provide panelboards that are UL listed and labeled for use as service entrance equipment.

J. Provide dead-front safety type panelboards as indicated, with panelboard switching and protective devices in quantities, ratings, types, and with arrangement shown. Provide with anti-turn solderless pressure type main lug connectors approved for use with copper or aluminum conductors.

K. Provide full-sized (100 percent) neutral bus. Provide suitable lugs on neutral bus for outgoing feeders requiring neutral connections.

L. Provide panelboards with bare uninsulated grounding bars suitable for bolting to enclosures.

2.03 POWER DISTRIBUTION CIRCUIT BREAKER PANELBOARDS

A. Provide power distribution circuit breaker panelboards equal to Square D I-Line, "HCM" or "HCW" series as applicable.

B. Where located in an area accessible to anyone other than only authorized personnel, provide doors that are hinged, latched and locking type.

2.04 GENERAL USE CIRCUIT BREAKER PANELBOARDS

A. Provide 208Y/120V three-phase general use panelboards equal to Square D NQOD with bolt-on branch breakers.

2.05 BUSSING

A. Provide copper or aluminum bussing.

2.06 CIRCUIT BREAKER PANELBOARD ENCLOSURES

A. Provide galvanized sheet steel cabinet type enclosures, in sizes and NEMA types as indicated, code-gage, minimum 16-gage thickness.

B. Provide boxes with code-compliant side and end gutters (minimum 4 inches), and of code gauge galvanized steel. Provide boxes that are 20 inches wide minimum, and 5-3/4 inches deep minimum. Provide boxes with multiple knockouts and wiring gutters.

C. Provide panelboard trims that are flush or surface as required for respective application, that are constructed of code gauge steel, that are finished with rust inhibiting prime coat and then factory applied hot spray lacquer or baked-on enamel, and that are factory painted manufacturer's standard light gray. Provide trims complete with concealed hinges and concealed trim clamps. Provide doors with flush chromium plated combination cylinder lock and catch, and with directory suitable for clear plastic. Provide locks that are keyed alike.

D. Provide enclosures that are fabricated by same manufacturer as panelboards, which mate and match properly with panelboards to be enclosed.

2.07 MOLDED CASE CIRCUIT BREAKERS

A. Provide factory-assembled, molded-case circuit breakers of frame sizes, characteristics, and ratings including RMS symmetrical interrupting ratings required for each application. Provide breakers with permanent thermal and instantaneous magnetic trip, with fault-current limiting protection, and with ampere ratings as indicated.

B. Provide coordinated series-rated circuit breakers as applicable throughout, accommodating respective available fault current.

C. Provide breakers that are designed to be mounted and operated in any physical position, and to be operated in a minimum ambient temperature of 40 degrees C. Provide breakers with mechanical screw type removable connector lugs, AL/CU rated.

D. Provide branch circuit breakers that are full ambient compensated thermal magnetic molded case type, with quick-make and quick-break action, and with positive handle trip indication (on both manual and automatic operation). Provide breakers of the over-the-center toggle operating type with the handle going to a position between "on" and "off" to indicate automatic tripping.

E. Provide bolt-on branch breakers.

F. Provide full size circuit breakers. Do not provide "tandem" or "split" breakers.

G. Provide circuit breakers above 225-ampere capacity with adjustable trip mechanism, accessible only after removing dead front of panel, compliant with NEC requirements.

H. Provide circuit breakers with sealed cases to prevent tampering.

I. Provide molded-case main and branch circuit-breaker types for each circuit as shown on drawings, with toggle handles that indicate when tripped.

J. Provide multi-pole breakers with all load side box lugs of one breaker in the same gutter.

K. Where multiple-pole breakers are indicated, provide with common trip so overload on one pole will trip all poles simultaneously.

L. Provide multi-pole breakers with common trip or with handle-ties (if needed because breakers have already been installed) for applications where it is determined that a common disconnecting means is required for multi-wire branch circuits serving, or within, the same enclosure, outlet box, equipment, or device.

M. Provide branch breakers (not sub-feed breakers) where breakers are shown as branches on drawings or schedules.

N. Provide 15 and 20 ampere branch circuit breakers that are UL Listed as SWD (switching duty).

O. Provide 15 through 70 ampere branch circuit breakers that are HACR Type.

P. Provide GFCI circuit breakers that are UL Class A with maximum threshold of 5 mA.

Q. Provide HID rated branch circuit breakers for circuits serving ballasted (fluorescent/HID) lighting loads.

R. All circuit breakers that are spares shall be put in the ‘OFF’ position and provided with a breaker lock.

2.08 FAULT CURRENT RATINGS

A. Provide electrical distribution related equipment with appropriately braced bussing and properly rated breakers, fuses, etc. for the available fault currents.

B. In existing buildings where fault current values are not indicated on drawings, coordinate with existing “upstream” distribution equipment, and provide equipment AIC ratings that meet or exceed same.

2.09 SERIES COORDINATION

A. Provide factory series coordination for all circuit breakers (including branch breakers), relative to upstream breakers, so that only the breaker closetst in the circuit to the load trips upon an overload or fault condition.

2.10 ACCESSORIES

A. Provide panelboard accessories and devices including, but not necessarily limited to, branch circuit breakers, neutral & ground busses, ground-fault protection units, etc., as recommended by panelboard manufacturer for ratings and applications indicated.

B. Provide distribution equipment with ground bus bars. Except where used as service entrance equipment, or as a derived service, provide insulated stand-off for neutral bus bars.

C. Provide a minimum of 20 handle, lock-on devices of the non-padlocking type for life safety, special systems and other essential circuits.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide enclosures fastened firmly to walls and structural surfaces, ensuring that they are permanently and mechanically anchored.

B. Provide properly wired electrical connections for panelboards within enclosures.

C. Anchor enclosures firmly to walls and structural surfaces, ensuring that they are level, and permanently & mechanically secure.

D. Provide neatly typewritten circuit directory card for each panelboard upon completion of installation work. Include the actual room names/numbers that are selected for interior signage/designation.

E. Scheduling shown on drawings is shown to indicate feeder and branch circuiting requirements. Determine exact numbering sequence of circuits in field after performing final balancing.

END OF SECTION

SECTION 26 2726

WIRING DEVICES

PART 1 GENERAL

1.01 RELATED SECTIONS

A. See Section` 26 00 02 for special identification-related requirements.

1.02 SUMMARY

A. Provide wiring devices, in types, characteristics, grades, colors, and electrical ratings for applications indicated which are UL listed and which comply with NEMA WD 1 and other applicable UL and NEMA standards. Verify color selections with Owner's representative.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following.

Switches:	Leviton, Hubbell, Bryant, Pass & Seymour, Cooper
Dimmers:	Lutron
Receptacles:	Leviton, Hubbell, Bryant, Pass & Seymour, Cooper
Wall Plates:	Leviton, Hubbell, Bryant, Pass & Seymour, Cooper

2.02 WIRING DEVICE COLORS

A. Unless specifically indicated otherwise, or directed otherwise in field, provide ivory color for normal utility wiring devices. Verify all device colors with owner prior to installing.

2.03 SWITCHES

A. Wall Switches

1. Provide wall switches, that are flush self-grounding with green ground screw and color coded cover, snap toggle type, back and side wired, specification grade. Provide wall switches rated 20A, 120/277 volts, 1 HP at 120V, A.C. quiet type. Where locking type switches are indicated, provide same as below except with "L" suffix (provide six keys). Catalog numbers below are based on Leviton.

Single pole, toggle:	Equal to Leviton 1221-2 series.
Double-pole, toggle:	Equal to Leviton 1222-2 series.
3-way, toggle:	Equal to Leviton 1223-2 series.
4-way, toggle:	Equal to Leviton 224-2 series.

B. Dimmer Switches

1. Provide dimmer switches that are specification grade, equal to Lutron "Nova T" (NT) series with thin profile and matching factory wall plates.
2. Provide Ceiling Fan Dimmer Switches fans that are same as incandescent units (plus rated and U.L. Listed for ceiling fan applications), and that are reverse acting, in that they shall turn on at the highest setting.
3. Provide Incandescent Lamp Dimmer Switches that are solid state type, conforming to NEMA WD 1, modular dimmer switches for incandescent fixtures; switch poles and wattage as required to serve respective load, 120-volts, 60-Hz, with continuously adjustable slide control (down to off). Equip with filter to eliminate noise, RF and TV interference, and 5 inch wire connecting leads.
4. Do not break off side sections when ganging.
5. Provide dimmer and wall plate colors that match other wiring devices in the respective room.

6. Provide lamp de-buzzing coils for incandescent lamp applications; install coils outside of rooms that are acoustically sensitive.
7. Multiple wallbox dimmers may be used sporadically throughout the project on common circuits; provide compatible dimmers accordingly.
8. Provide dedicated neutrals for circuits serving loads controlled by dimmers.

2.04 SPECIFICATION GRADE RECEPTACLES

A. Standard Specification Grade Duplex/Single Receptacles
1. Provide duplex and single specification grade receptacles, 2-pole, 3-wire grounding, self-grounding, green grounding screw, ground terminals and poles internally connected to mounting yoke, color coded base, 20-amperes, 125-volts, with metal plaster ears, back & side wiring, NEMA configuration 5-20R.
2. Provide duplex receptacles equal to Leviton #5362 series. For receptacle circuits protected with 15A breakers, provide NEMA 5-15R equivalents. Provide receptacles equal to Leviton #5361 series for simplex (single) applications. Provide clock hanger receptacles equal to Leviton #5361-CH.

B. "Safety" Type Receptacles (Tamper Resistant)
1. Provide self-grounding, duplex specification grade receptacles, 2-pole, 3-wire grounding, self-grounding, green grounding screw, ground terminals and poles internally connected to mounting yoke, color coded base, 20-amperes, 125-volts, with metal plaster ears, back & side wiring, NEMA configuration 5-20R, with shutter mechanisms for tamper resistant applications.
2. Provide tamper resistant receptacles with tamper resistant wall plate mounting screws (with 50 spare screws and six spare drivers for same).
3. Provide duplex tamper resistant receptacles equal to Leviton #5262-SG series. For receptacle circuits protected with 15A breakers, provide NEMA 5-15R equivalents.

2.05 WIRING DEVICE ACCESSORIES

A. Wall Plates
1. Provide single and combination, of types, sizes, and with ganging and cutouts as required to accommodate each application. Provide plates which mate and match with wiring devices to which attached. Provide metal screws for securing plates to devices with screw heads colored to match finish of plates. Provide wall plate color to match wiring devices unless specifically indicated otherwise.
2. Provide standard size wall plates. Do not provide "midway", "oversized" ("jumbo") or "extra deep" wall plates.
3. Provide galvanized steel wall plates in unfinished exposed-conduit areas.
5. Provide commercial specification grade thermoplastic wall plates in finished areas.
6. Provide receptacle wall plates with adhesive label identification of source panel and circuit number. Provide black lettering (1/4 inches high), and transparent background. Provide labels and lettering that are impervious to normal surrounding ambient heat and light. Install labels perfectly level/plumb. Utilize material that renders a virtually permanent adhesion, but that can be removed with a razor blade.

PART 3 EXECUTION

3.01 INSTALLATION

A. Unless directed otherwise by the local electrical inspector, install receptacles so that they are oriented with the ground pin at the bottom.

B. Install wiring devices only in electrical boxes that are clean; free from building materials, dirt, and debris. Install wiring devices after wiring work is completed. Install wall plates only after respective wall surfaces have received their final finish.

C. Prior to energizing circuits, test wiring for electrical continuity and for short-circuits. Ensure proper polarity and grounding of connections is maintained. Subsequent to energizing, test wiring devices and demonstrate compliance with requirements, operating each operable device at least six times. Test ground fault interrupter operation with both local and remote fault simulations in accordance with manufacturer recommendations.

END OF SECTION

SECTION 26 2730

FLOOR DEVICES

PART 1 GENERAL

1.01 RELATED SECTIONS

A. See Section 26 27 26 for wiring devices and cover plates. Provide wiring devices in floor boxes as required to fulfill respective applications.

1.02 DESCRIPTION OF WORK

A. Provide electrical floor devices (boxes/outlets) specified in this section including the following types.
   1. Flush activation floor outlets.

B. **Meet with Architect before making final room-by-room catalog number selections for cover plates (i.e. color) on all floor finishes (carpet, tile, wood, etc.) to ensure compatibility with room finishes (i.e. heights, flange/trim colors, special floor finishes, etc.) regardless of what is defined here-in.**

C. Meet with telecommunication system installers before making final box-by-box catalog number selections for the internal mounting bracket assemblies to ensure compatibility with outlet functions.

D. Make exact catalog selection based on type of floor structure in the respective room, and based on type of final floor finish in the respective room. Coordinate with Architectural Drawings and Architect as required to make proper selections, including selection of brass vs. aluminum flanges.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, provide floor outlets of one of the following:
   1. Legrand/Wiremold
   2. FSR Inc.
   3. Hubbell.

2.02 FLUSH ACTIVATION FLOOR OUTLETS

A. Type B Series: Multi-Service Floor Boxes with Flush Activation
   1. Provide square or rectangular flush floor boxes equal to Wiremold “Omnibox” series.

   2. Provide cast iron units (#880CS2-1) for slab on grade applications and steel units (#880S2) for floors above grade, with internal compartment dividers.
      a. Provide Wiremold #827B two-gang combination carpet and tile flange.
      b. Provide one duplex receptacle, and one #828R duplex cover plate with screw plugs.
      c. Provide adjustable flush floor boxes as indicated, with vertical adjusting rings, gaskets, floor plates with flush covers with ground flange and stainless steel cover screws.
      d. Provide shallow units for shallow pour applications (only); verify in field.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide factory plates, adapters, inserts, extensions, nipples, flanges, mudcaps, rings, conversion kits, etc. accessories as required for complete working units for each application.

B. Do not scale floor outlet locations from drawings.

C. Consider locations indicated on the drawings to be approximate (unless specifically dimensioned on drawings). Determine exact locations of each floor outlet, case by case, after consulting with Owner and Architect, and after reviewing architectural documents so outlets are properly located to accommodate the final furniture and equipment layouts. Study the general construction with relation to spaces and equipment surrounding each outlet.

D. Provide sealed knockout closures to cap unused knockout holes where blanks have been removed. Install outlets in locations that ensure ready accessibility to enclosed electrical wiring.

E. Do not use aluminum products in concrete.

F. Fasten electrical boxes firmly and rigidly to substrates, or structural surfaces to which attached, or solidly embed electrical boxes in concrete or masonry. Support boxes independent of conduit.

G. Set floor boxes so that the finished product is level and flush with finish flooring material.

END OF SECTION

SECTION 26 27 40

DISCONNECTS, STARTERS, CONTACTORS

PART 1 GENERAL

1.01 RELATED WORK

A. Provide NEMA standard equipment, including those incorporated as an integral part of a factory/shop pre-fabricated piece of equipment. Do not use IEC standards for equipment.

B. Provide units as indicated on drawings and as indicated under Division 26 sections.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, provide equipment of one of the following (for each type and rating):
   1. Allen-Bradley Co.
   2. General Electric Co.
   3. Siemans/ITE
   4. Square D Co.
   5. Eaton

2.02 MATERIALS

A. Disconnect Switches
   1. Provide disconnect switches equal to Square D Type HD, heavy duty, safety type, quick make and quick break and externally operated.
   2. Provide fusible disconnects unless noted otherwise on drawings or directed otherwise in field.
   3. Provide disconnect switches braced for 200,000 A.I.C.
   4. Provide units with fuses of classes and current ratings indicated, and UL listed for use as service equipment under UL Standard 98 or 869. See Section "FUSES" for fuse specifications. Where current limiting fuses are indicated, provide switches with non-interchangeable feature suitable only for current limiting type fuses.
   5. Install disconnect switches within sight of controller position unless otherwise indicated.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide units with horsepower ratings suitable to the loads. Size units according to load being served or as noted on drawings, whichever requirement is larger. Install overloads and fuses as necessary to fulfill requirements of each application.

B. Furnish additional fuses/overloads amounting to 10 percent of fuses provided, but not less than one set of 3 of each kind, for required types and ratings.

C. Provide NEMA 3R enclosures for units that are installed outdoors, in moist areas, and in other atmospheres subject to similar moisture or exposure.

D. Inspect operating mechanisms for malfunctioning and, where necessary, adjust units for free mechanical movement. Subsequent to completion of installation of equipment, energize circuits and demonstrate capability and compliance with requirements. Begin by demonstrating switch operation through six opening/closing cycles with circuit unloaded. Open each switch enclosure and inspect interiors, inspect mechanical and electrical connections, inspect fuse/overload installations, and verify accuracy of type and rating of fuses/overloads installed. Correct deficiencies then retest to demonstrate compliance. Remove and replace defective units with new units and retest.

END OF SECTION

SECTION 26 2813

FUSES

PART 1 GENERAL

1.01 RELATED WORK

A. Types of fuses specified in this section include the following.
   1. Class RK1 current limiting/time-delay.
   2. Class RK5 current limiting/time-delay.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, provide fuses of one of the following. Provide fuses of the same manufacturer.
   1. Bussman.
   2. LittelFuse.
   3. Shawmut (A4BQ series).

2.02 MATERIALS

A. Fuses
   1. Except as otherwise indicated, provide fuses of types, sizes, ratings, and average time-current and peak let-through current characteristics indicated. Provide fuses that comply with manufacturer's standard design, and materials. Provide fuses constructed in accordance with published product information, and with industry standards and configurations.
   2. Provide rejection type fuses for fuses 1 ampere through 600 amperes.
   3. Provide Hi-Cap, bolt type fuses for fuses 601 amperes through 6000 amperes.

B. Class RK1 Current-Limiting/Time-Delay Fuses
   1. Provide UL Class RK-1 fuses for protecting service entrances, and distribution feeders 600 amperes and below. Provide fuses that are current-limiting, time-delay, dual-element type (with pure silver links), equal to Bussman #LPS-RK1 (600V) or Bussman #LPN-RK-1 (250V) as applicable. Provide fuses that are rated 60 Hz, with 200,000 RMS symmetrical interrupting current rating.

C. Class RK5 Current-Limiting/Time-Delay Fuses
   1. Provide UL Class RK-5 fuses for protecting general duty motors. Provide fuses that are time-delay, dual-element type (with pure silver links), equal to Bussman #LPS-RK5 (600V) or Bussman #LPN-RK-5 (250V) as applicable. Provide fuses that are rated 60 Hz, with 200,000 RMS symmetrical interrupting current rating.

D. Cable Limiters
   1. Provide cable limiters rated 600-volts, 60 Hz with tubular type terminals for compression connection to 500 kcmil (MCM) copper cable. Provide cable limiters only where specifically called for on specialty applications, or where specifically directed in field.

2.03 ACCESSORIES

A. Fuse Identification Labels
   1. Provide factory fuse identification labels, installed on the inside of the door of each switch, indicating type and size of fuses installed.

B. Maintenance Stock
   1. Furnish spare fuses, for types and ratings used on the project, amounting to 10 percent of active fuses provided, but not less than one set of 3 of each kind.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide fuses as required to render related electrical, and electrically operated, equipment fully operational.

B. Provide fuses rated at 600 volts minimum, unless the service entrance voltage does not exceed 240V.

C. Provide each fuse with clear factory markings indicating classification, characteristics, ampere ratings, voltage ratings, etc.

D. Do not ship fuses installed in switches. Do not install fuses in equipment until the equipment is ready to be energized.

E. Field verify recommended fuse size and type from respective equipment installer prior to installing fuses for protection of specific equipment, motors, etc. Contact engineer if a conflict in fuse size or type arises between manufacturer's recommendations and above specifications.

F. Install fuses in fused switches.

END OF SECTION

SECTION 26 4313

SURGE PROTECTION DEVICES FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

PART 1 GENERAL

1.01 SUMMARY

A. This section includes requirements for Surge Protection Devices (SPD) for the power distribution system. If terms such as TVSS or transient voltage surge suppression are indicated elsewhere in Division 26 documents, they shall be taken to mean SPD. Specific SPD related work may not be indicated on drawings. Work indicated hereafter is intended to schematically define related work. Provide complete SPD systems as define in this section and as shown on drawings. Refer to drawings for equipment, component, device, and assembly locations, layouts, current rating requirements, voltage/phase requirements, and other relevant details.

1.02 SUBMITTALS

A. Submit manufacturer's SPD data. Include tabulation of system features and performance characteristics. If equipment other than the basis of design is proposed, include in tabulation line by line comparison of data for the proposed equipment to the specified equipment. Provide characteristics that meet or exceed those specified.

PART 2 PRODUCTS

2.01 GENERAL

A. Provide products of a manufacturer of established reputation and experience who has been in operation of sufficient length of time to establish proof of high quality, acceptable to the Owner.

B. Provide products compliant with the following.
1. Underwriter’s Laboratory UL Standard 1449 latest Edition Listed.
2. CUL latest edition Listed.
3. NEMA LS-1 latest edition compliant.
4. ANSI/IEEE C62.41/62.45 latest edition compliant.
5. MIL Standard 220A compliant.

C. Protection and Filtering Elements
1. Test the SPD device repetitive surge current capacity utilizing a 1.2x50 microseconds 20kV open circuit voltage, and 8x20 microseconds 10kA short circuit Category C3 test waveform (as defined by ANSI/IEEE C62.41-1991 and ANSI/IEEE C62.45-1992) at one minute intervals. Define a failure as either performance degradation, or more than 10% deviation of clamping voltage, at the specified surge current.
2. Base maximum surge current ratings on testing of a complete SPD unit including fuses and components that make up the SPD system. Do not devices a maximum surge current rating by adding test results of individual components.
3. Provide fusing system capable of allowing the rated maximum surge current to pass through without fuse operation. Do not provide systems utilizing a fusing system that opens below the maximum surge current level. Provide fusing system with thermal fuses and surge rated fuses, and include them in the surge current testing.
4. Do not provide systems using gas tubes, silicon avalanche diodes, selenium rectifiers, or printed circuit board technology in surge current path.
5. Provide maximum Continuous Operating Voltage (MCOV) for each voltage configurations at 115 percent of nominal.

D. Provide SPD materials and components that comply with manufacturer's standard design, in accordance with published product information.

E. Provide equipment equal to compliant products offered by G.E., Square D, Eaton, Advanced Protection Technologies (APT), Siemens Sentron TPS, Liebert, LEA, Current Technology, United Power, and Leviton. Provide SPD units with the following features.
1. LED Status lights.
2. Remote monitor contacts.
3. Seven Mode device.
4. Third-party tested.
5. Compliance with UL 1449 2nd Edition.
6. Compliance with NEMA LS-1, 1992.
7. Compliance with ANSI/IEEE 62.41 and ANSI/IEEE 62.45.

2.02 SURGE PROTECTION DEVICES (SPD)

A. High Exposure Units (at Service Entrance Switchboards/Distribution Panels)
1. Provide high exposure units for service entrance switchboard and distribution panel applications. Provide units equal to G.E. Tranquell HE Series, including the following additional features.
a. Rate at minimum 100kA per mode (equal to 200kA per phase).
b. Provide integrated non-fused disconnect, tested to maximum surge current rating of device (with ability to remove unit without shutting down board).
c. Provide audible alarm.
d. Provide alarm indicating light.
e. Provide alarm silence and test switch.
f. Provide surge counter with battery backup and field sensitivity.
g. Comply with UL 1283, EMI/RFI noise filtering with –40dB voltage attenuation at 100 kHZ, per NEMA LS-1/MIL 220A.
2. Test Suppression Voltage Rating (SVR) with the integral disconnect in accordance with UL-1449, Second Edition. Provide unit with SVR values not exceeding the following (including SPD disconnect).

Nominal Voltage Configuration	L-N	N-G	L-G	L-L
120/208 Grounded Wye	400	400	400	700
277/480 Grounded Wye	800	800	800	1500
240 Delta			700	700
480 Delta			1500	1500

B. Low Exposure Units (at end-use general use Panelboards)
1. Provide low exposure units for end-use general use panelboards. Provide units equal to G.E. Tranquell LE Series, including the following additional features.
a. Rated at minimum 50kA per mode (equal to 100kA per phase).

C. Enclosures
1. Fully integrate SPD units connected to power distribution equipment within the equipment protected, including direct bus connections wherever possible. Factory install integrated SPD units with collective assembly tested and UL Listed accordingly, and with the face of SPD unit (including LED's, integral switches, etc. as applicable) visible/accessible from outside the dead front. Size enclosure heights accordingly.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide materials and related work compliant with latest edition of the National Electrical Code (NEC).

B. Unless otherwise indicated on drawings, provide one appropriately rated SPD unit for each service, distribution and branch panel. Where panelboards are installed side by

side, and connected to each other via sub-feed (or feed-through) lugs from a common feeder, provide only one SPD unit for the pair or group as applicable. Provide wiring in strict accordance with manufacturer's recommendations.

C. Coordinate with field conditions as necessary to interface installation of SPD.

END OF SECTION

SECTION 26 5113

LUMINAIRES

PART 1 GENERAL

1.01 RELATED WORK

A. Provide luminaires as indicated on drawings.

B. Provide submittals for luminaires, ballasts, lamps, and applicable accessories. Arrange luminaire submittals in booklet form with separate sheets for each luminaire, assembled by luminaire "type" in alphabetical order, with proposed luminaire and accessories clearly indicated on each sheet including job-specific full catalog number. Submit details indicating compatibility with ceiling grid system. Provide separately tabbed sections for lamp submittals and for ballast submittals. Include lamp/ballast schedules (by luminaire type) and related technical submittal data in lamp submittals and in ballast submittals.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, provide products of one of the manufacturers listed on the Luminaire Schedule. Provide products of one of the manufacturers listed in this section for products that are not defined on the Luminaire Schedule.

B. Various luminaire types and manufacturers are indicated on the Luminaire Schedule. Provide luminaires that comply with minimum requirements as stated therein.

C. Review drawings and specifications of other trades to verify ceiling types, modules, suspension systems appropriate to installation.

D. If a particular submittal does not include basis of design manufacturer or model number, provide "approved equal", “equal” and “equivalent” manufacturers and model numbers compliant with, and equivalent to: quality, performance, dimensions, and aesthetics as the respective basis of design.

2.02 MATERIALS

A. Luminaires

1. Luminaires designated by letters are defined as indicated on the Luminaire Schedule.
2. Provide luminaires, lamps, ballasts, and accessories with U.L. listing and labeling for their specific application for this project.
3. Provide luminaires, of sizes, types and ratings indicated; complete with, but not limited to, housings, energy-efficient lamps, lampholders, reflectors, energy efficient ballasts, starters and wiring. Ship luminaires factory-assembled, with components required for a complete operating installation.
4. Fabricate luminaires with concealed hinges and catches, with metal parts grounded as common unit, and so constructed as to dampen ballast generated noise.
5. Install surface mounted ballasted luminaires with air spaces between luminaire and surface per latest edition of NFPA/NEC. Provide factory luminaire wiring that is per NEC, #16 AWG minimum. Wire luminaires

having medium base and mogul base sockets with not smaller than No. 16 or No. 14 wire respectively in accordance with the latest requirements of the National Electric Code.

B. Recessed Luminaires
   1. Provide recessed luminaires with necessary gypsum board, plaster frames, and surface trim.
   2. Provide recessed luminaires that are constructed without rolled edges and that are post-painted.
   3. Provide door frames on troffer style luminaires with spring latches on door frames.
   4. Provide static air function for luminaires unless otherwise noted.
   5. Provide luminaires that are non-IC constructed unless otherwise noted.
   6. Provide junction boxes and serviceable components (ballasts, thermal protection devices, fuses, etc.) for recessed luminaires that are accessible for service and replacement from below the ceiling, without removing ceiling components.
   7. Where plaster frames are inferred for luminaires (either by narrative, or by catalog number, or by application) interpret the actual function to mean for mounting within gypsum board, wet plaster or similar type inaccessible ceiling system. Field verify related requirements and provide required accessories, such as frames, accordingly.
   8. Provide UL approved (listed and labeled) thermal protection per latest edition of NFPA/NEC for recess mounted luminaires.

C. Provide recessed fluorescent luminaires that are suitably constructed to operate with "P" rated ballasts as specified hereafter
   1. Provide same manufacturer and catalog number for ballasts of the same type. Refer to the drawings for input voltage requirements. If fusing requirements are indicated herein or on the Luminaire Schedule, fuse each ballast separately with a replaceable fuse external to the ballast.
   2. Provide ballasts that are compatible with power line carrier systems, and that do not adversely impact such systems.
   3. Provide luminaires shown on drawings with multi-level switching or similar special circuiting with multiple ballasts. Provide single ballasts wherever possible for other applications.

D. Solid State Rapid Start Electronic Fluorescent Lamp Ballasts
   1. Provide low energy solid state rapid start electronic fluorescent lamp ballasts for fluorescent lamps, specifically designed for operating lamp types indicated. Provide Electronic Ballasts that are manufactured by Advance, Motorola or Magnetek, 100% electronic with reduced harmonics, and with the following characteristics.
      a. High power factor (0.9 minimum).
      b. Full and constant lumen output at voltage ranges of 90V to 145V (120V ballast) and 200V to 320V (277V ballast).
      c. Minimum Ballast Factor of 0.95.
      d. Rapid-start.
      e. Type 1, Class P.
      f. Sound rated "A".
      g. Maximum sound level of 2 dB above 16 dB ambient.
      h. Automatic reset type thermal protection.

i. U.L., CSA and CBM approved, listed and labeled.
j. NAECA and EPCA compliant.
k. FCC compliant (as relates to EMI and RFI).
l. Input current Third Harmonic Content (THD) maintained equal to or less than 20% of input current.
m. Crest Factor of less than 1.4.
n. Internal fusing.
o. Operation without visible flicker.
p. Capability of operating all types of Long Twin Tube fluorescent lamps and all types of two, three or four foot rapid start lamps.
q. Line transient withstand capability per IEEE 587-A.
r. Minimum two year factory warrantee.

E. Emergency Battery Ballasts
1. Provide emergency lighting using a standard fluorescent luminaire equipped with emergency battery ballast. Provide battery ballast as follows depending on the lamp types and designation on the drawings.
a. “EM13” designation: Provide Bodine LP600 or approved equivalent. Provide emergency ballast capable of operating one 28 watt, T5 fluorescent lamp at 1245 lumens initial light output in the emergency mode for a minimum of 90 minutes. Provide emergency ballast circuit that delays AC ballast operation for five seconds upon restoration of normal power to prevent false-tripping of AC ballast end-of-life shutdown circuit. Provide unit with high-temperature, maintenance-free nickel cadmium battery, charger and electronic circuitry contained in one nominal 21.5” x 1.18” x 1.18” galvanized steel case. Provide solid-state charging indicator light to monitor the charger and battery. Provide single-pole test switch. Provide installation hardware. Provide emergency ballast that is UL listed for installation inside, or on top of the luminaire. Provide full five year warranty from date of purchase.

F. Lamps
1. Provide lamps of the same type that are of the same manufacturer and catalog number. Contact engineer for direction prior to ordering related materials if a luminaire manufacturer requires a special lamp that is not addressed herein.
2. Provide compact fluorescent luminaires with T-5 lamps and smaller with end-of-life circuit cutout feature equivalent to Osram Sylvania “Quick Sense”

G. Incandescent Lamps
1. Provide incandescent lamps manufactured by General Electric, Osram Sylvania or Philips. Provide incandescent lamps that are long-life type (3000 hours). Provide incandescent lamps that are soft white finish unless specifically directed otherwise. Provide socket adapters/extenders if required for accommodating the specified lamp.

H. Halogen Lamps
1. Provide halogen lamps manufactured by Osram Sylvania or Philips.
2. Provide MR-16 halogen lamps that are enclosed, 10,000 hour rated, and of beam angle as indicated in Luminaire Schedule. Provide halogen lamps manufactured by USHIO America, Inc. or EYE Lighting International of

North America, Inc. Provide PAR-Halogen lamps that are low IR (cool-beam) type, 3000 hour, medium base.

3. Provide Quartz-Halogen lamps used for "quartz restrike" applications as recommended by luminaire manufacturer.
4. Provide frosted type lamps for other quartz-halogen applications.
5. With the exception of PAR lamps, provide halogen lamps with lamp guards to protect against non-passive failure. Provide guards constructed of metal, glass, porcelain, or ceramic materials. Positively secure guards.
6. Provide socket adapters/extenders if required for accommodating the specified lamp.

I. Compact Fluorescent Twin-Tube/Dual Twin-Tube and Triple-Tube Lamps
1. Provide compact fluorescent twin-tube, dual twin-tube, triple-tube, quad twin-tube, and long twin-tube lamps that are 82 CRI, minimum 10,000 hours rated, and manufactured by G.E., Osram Sylvania, or Philips.
2. Provide 3500 degree K lamp color temperature.

J. T8 Fluorescent Lamps
1. Provide T8 fluorescent lamps that are rapid start, energy saving type, minimum 82 CRI, and minimum 20,000 hours rated. Provide lamps manufactured by G.E., Osram Sylvania, or Philips - equal to Osram Sylvania #FO_____ series.
2. Provide 3500 degree K lamp color temperature.

K. Light Emitting Diode (LED) Cards
1. Provide factory installed LED cards that are specifically designed for, and matched and mated to, the respective luminaire in which they are used.
2. Provide LED cards that can easily be replaced in the field and are readily accessible for replacement.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install surface and recessed ceiling luminaires on grid and tile ceilings to agree with module of ceiling either displacing a tile, or unit on center of tile, or centered on grid lines.

B. Install flush mounted luminaires properly to eliminate light leakage between luminaire frame and finished surface.

C. Do not locate splice or tap within an arm, stem, or chain. Provide wiring continuous from splice in outlet box of the building wiring system to lamp socket, or to ballasts terminals in fluorescent luminaires.

D. Provide Type AC/MC Cable or wiring in minimum 1/2” diameter flexible metal conduit (with full parity sized green insulated equipment ground wire) for "drops" from building wiring system junction boxes to suspended ceiling mounted luminaires. Limit the length of these “drops” to 72”. Install "drops" to luminaires in gypsum board, and similar inaccessible ceiling systems, from identified accessible junction boxes.

E. Connect luminaires utilized for emergency egress lighting ahead of switching and other controls. The only exceptions to this are photocell-only controls for outdoor emergency egress luminaires.

F. Provide luminaires and luminaire outlet boxes with hangers to properly support luminaire weight. Submit design of hangers, method of fastening, other than indicated or specified herein, for review by Owner's representative and review by ceiling installer. Anchor luminaires installed in, or on, suspended ceiling systems in strict compliance with NEC, including advance coordination with the ceiling installer. Support surface mounted luminaires greater than 2 feet in length at a point in addition to the outlet box luminaire stud.

G. Fasten electrical luminaires and brackets securely to structural supports. Install luminaires level and plumb.

H. Where special mounting conditions are encountered, such as mounting to rounded columns or similar special circumstances, provide special factory fabricated mounting means (i.e., brackets designed to conform with curvature of rounded columns, or to conform with similar special surfaces).

I. Provide stems and chains for luminaires as designated by the Owner's representative where deemed necessary by the owner’s representative to achieve a functional and neat installation. Contact owner’s representative to determine pendant, stem, and chain lengths if mounting height is not indicated.

J. Provide plaster frames, or gypsum board frames, or similar kits for recessed luminaires installed in other than suspended grid type acoustical ceiling systems. Brace frames temporarily to prevent distortion during handling.

K. Where used for temporary lighting prior to time of Substantial Completion, replace incandescent lamps, as well as lamps that are defective, damaged or burned out.

L. Wear clean white cotton gloves when handling the luminaires reflective and diffusing surfaces. Clean surfaces including dust, finger prints, paint, etc with a clean dry cheesecloth after interior work has been completed. Remove plastic shipping bags from luminaires only after work in the respective area is complete.

M. Where applicable, verify that measured illuminance values comply with respective isolux (or equivalent) plot diagram values.

N. Aim adjustable luminaires as directed in field by Owner's representative.

O. In cases where luminaires are furnished by others, provide the following services: receive, transport and securely store luminaires on site; remove luminaire components from packaging; assemble all luminaire components per factory instructions; install, wire and connect luminaires as recommended by manufacturer and render luminaire fully operational.

3.02 SPARE LAMPS

A. Furnish stock of unused, unopened replacement lamps amounting to at least 15 percent, but not less than 4 lamps in each case, of each type and size lamp used in each type luminaire. Deliver and neatly store this replacement stock as directed to Owner's storage space.

B. With the exception of surface mounted exit sign luminaires, the above paragraph also applies for LED cards for luminaires lit via light emitting diodes.

END OF SECTION

WEST VIRGINIA STATE MUSEUM
SCENIC ELEMENTS

General Notes

1. Drawings for Scenic Elements (SN) shown in the Scenic Design Package represent "design intent" only and are to be used only as an indication of general size, arrangement, layout and complexity of scenic elements
2. All SN are to be fabricated, painted and finished to museum quality level suitable for close up viewing by guests. All SN should appear realistic with visible details, period hardware and period construction techniques consistent with the periods and eras depicted by the SN and in accordance with visual reference.
3. Contractor shall determine final locations, sizes, methods and materials for all SN elements based on site survey by Contractor and in accordance with site conditions
4. Contractor shall coordinate design and installation of SN elements to accommodate structural, mechanical, HVAC, lighting, audio, video and graphics represented in the design package and in the existing Museum.
5. Contractor shall provide detailed line art development or shop drawings, based on the provided reference and input from the WVDCH, for review and approval.
6. Upon approval of line art or shop drawings, Contractor shall provide color art development for review.
7. Upon approval of color art, Contractor shall provide quality control samples of each type of painted surface for review in a size adequate to indicate color and texture size for approval by WVDCH
8. All quality control samples shall be approved by WVDCH prior to commencement of fabrication or ordering. All final SN fabrication, finishing and installation shall be based on and in accordance with approved samples. All samples and submittals become and remain the property of WVDCH.
9. All SN fabrication, installation and associated material shall meet all applicable fire codes including NFPA 101 2003 and must, at a minimum, meet Class B requirements. Inherently flame retardant material shall be used by the Contractor to the greatest extent possible. All flame retardant treatments shall be permanent and not require periodic retreatment.

Item Number	Description	Location
SN-01-S-5	Glowing Fire Embers Effect Realistic glowing ground ashes, embers, and charred logs Hearth floor to be filled with effect	S-5 Cabin
SN-02-S-5	Andirons Wrought iron and age period appropriate To appear ages and fire charred	S-5 Cabin
SN-03-S-5	Cornbread Sticks Skillet with Baked Golden Cornbread Sticks Cast iron and age period appropriate Cornbread sticks to be golden brown	S-5 Cabin
SN-04-S-1	36" High Wood Pedestal Base for John Hale Bust 36"H Base to match style of adjacent desk Size to be approx. 14" sq.; confirm with Bust size Finish: match adjacent desk	S-1 John Hale
SN-05-S-2	Tree Stumps - Five (5) American Chestnut tree stumps - match adjacent style Heights to vary between 30" to 36"	S-2 River Plains
SN-06-S-4	Ten (10) Life-sized Cut Out Flats of Pioneers Made from layers of 3/4" PVC sandwiched over hidden metal frames Anchor flats to floor; mounting hardware to be hidden Full color digital art with time appropriate clothing and farm tools Flat edge to be painted and artwork sealed with clear non glossy	S-4 Fort
SN-07-S-4	Three (3) Monitor Bases Custom wood monitor base surrounds to conceal metal pedestals Refer to drawing within design package	S-4 Fort
SN-08-S-2	Tree Limb Match existing tree: Sugar Maple in summer season Coordinate limb size with animatronic Cardinal Scale to be consistent with existing tree	S-2 River Plains
SN-09-S-6	Marble Base for Animatronic Bust Approx. 6"H Faux Marble Base; verify size with animatronic and speaker Finish to be black marble with gray veins Speaker to be hidden within faux marble base	S-6 Case for Stateho

WEST VIRGINIA STATE MUSEUM
SCENIC ELEMENTS

Item Number	Description	Location
SN-11-S-12	Clean Room Metal stud wall with 5/8" gypsum wall board to ceiling above 3'-0" Solid Core Wood Door paint grade in metal frame; provide storeroom lockset Wall Paint: Sherwin Williams Paint #SW-6077 Everyday White; Eggshell Finish Door and Frame Paint: Sherwin Williams Paint #0055 Light French Gray; Semigloss Finish	S-12 Conservator
SN-12-S-12	Desk and Chair Chrome chair with gray fabric seat and back Wood Oak Desk with drawers	S-12 Conservator
SN-13-S-12	Desk Accessories Misc office supplies; refer to design intent sketch	S-12 Conservator
SN-14-S-12	Lab Accessories Misc conservation tools, supplies and faux artifacts on desk	S-12 Conservator
SN-15-S-12	Wall Shelving Wood Oak shelving 14" deep and 78"H Artifacts on shelving by WVDCH Collections Dept.	S-12 Conservator
SN-15-S-8	Baby Birds and Nest Realistic 6"Dia nest with 2 static baby cardinal birds Birds to have mouths open and visible from sight line of guest below Nest to have one animatronic baby bird which must conceal all equipment. 150% of actual size.	S-8 Company Town
SN-16-S-8	Static Female Cardinal Realistic Female Cardinal to coordinate with animatronic male cardinal Bird standing on edge of nest with worm in beak. 150% of actual size.	S-8 Company Town
SN-17-S-8	New Tree Limb for Nest and two Cardinals Match existing tree: Golden Grimes Tree in summer Coordinate limb size with animatronic Cardinal Scale to be consistent with existing tree	S-8 Company Town
SN-18-S-8	12 Golden Delicious Apples Match existing apples Add throughout tree above guest reach	S-8 Company Town
SN-19-S-P-3B	Tree Limb Match existing tree: White Pine in the Fall Season Coordinate limb size with animatronic Cardinal Scale of limb to be consistent with existing tree	P-3B Overlook
SN-20-S-7	Three (3) Blasting Powder Plungers Plungers to look period appropriate and with cords Approx. Size: 18"H x 10"D x 7"W Working plunger with realistic resistance for guests A sound reaction occurs when the handle is lowered	S-7 Railroad
SN-21-S-7	Crates (3) Approx. Size: 20" x 20" x 30" Period appropriate crates with aged/worn appearance Stencil words: Keep Dry	S-7 Railroad
SN-22-S-7	Powder Kegs (3) Barrels Approx. Size: 18"H Period appropriate crates with aged/worn appearance Stencil words: Explosives ~ Danger	S-7 Railroad
SN-26-P-1A	Static Portrait, Woman Refer to Design Package for details	P-1 John Brown
SN-27-P-1A	Decorative Frame, Old Man Refer to Design Package for details	P-1 John Brown
SN-30-P-1A	Decorative Frame, Slave Refer to Design Package for details	P-1 John Brown
SN-31-P-1A	Decorative Frame, Static Man Refer to Design Package for details Mounted to bridge with other Crows	P-1 John Brown
SN-34-P-3A	Six (6) Telephone Poles with Cross Bars and Glass Insulators Wood 10"Dia Round with spike marks out of guest reach Finish: Dark brown/black; Aged	P-3A Transportation

WEST VIRGINIA STATE MUSEUM
SCENIC ELEMENTS

Item Number	Description	Location
SN-35-P-3A	Vines on Telephone Pole	P-3A Transportation
	Light treatment of Kudzu Vines	
	Vines to trail on floor, guardrail, and up telephone pole to cross bars	
SN-36-P-3A	Decorative Fence	P-1B Harpers Ferry
	Match existing style, material and height	
	Refer to Design Package for location details	
SN-37-P-2	Steamboat Façade	P-2 Wheeling
	Façade and Deck to match 'Mountain Boy' steamboat historical images	
	Refer to Design Package for plan and elevation details	
	Finish: Refer to historical images;	
	Color rendering of facade to be provided for approval prior to painting	
	WVDCH Collections to be responsible for any additional artifacts placed on façade	
SN-38-P-2	Cut Out Dock Worker Flat	P-2 Wheeling
	Made from layers of 3/4" PVC sandwiched over hidden metal frame	
	Anchor flat to gang plank; mounting hardware to be hidden	
	Full color digital art with time appropriate clothing and cargo	
	Edge of Flat to be painted and artwork sealed with clear non glossy sealer	
SN-39-P-2	Shipping Crates, Barrels, Boxes, and Supplies	P-2 Wheeling
	Approx. 2 Crates, 4 Barrels, 3 medium Boxes, 2 spools of jute rope	
	All items to be period appropriate and aged	
SN-40-P-2	Painting Enhancement of South Wall Silhouettes	P-2 Wheeling
	Painted warm yellow glow in 50 misc. windows	
	Painted walking silhouettes in street of people, horses, and dogs	
	Painted silhouettes to be black with very little detail	
SN-41-P-4	Fabric Tent for AR Game	P-4 Fairs & Festivals
	Blue and White vinyl tent structure with partial sides	
	Approx. Size: 8'W x 4'Deep	
SN-42-P-1C	Partial Tents (2) at Wall Mural	P-1C Battle of Philipp
	Locate against mural and continue 3-D mural image	
	Approx. 36"D x 72"L x 48"H	
	Style period appropriate, Confederate origin	
	Finish: color and style to match mural; aged	
	Tent and canvas to be durable to withstand visitor abuse	
SN-43-P-1C	Timber Wagon	P-1C Battle of Philipp
	Period appropriate Confederate origin	
	Scale to fit existing road Showpath ruts	
	Worn and been in battle	
	Display of Canon balls, wadding, tools and etc involved in cannon firing	
SN-44-P-4	Wood Picket Fence	P-4 Fairs & Festivals
	Approx. 12' wide x 24" high (verify actual size); return to wall at east (left) side	
	3" Wide Pickets; Curved top edge	
	Finish: White-washed white and weathered/worn	
	All mounting hardware to be concealed	
SN-45-P-4	Horseshoe Sign	P-4 Fairs & Festivals
	Approx. 36" x 36" hand stenciled wood sign	
	Style as an "A-Frame" with text on one side	
	Sign finish: White sign board with red lettering; legs/frame of sign to be navy blue	
	Appears weathered/worn	
	Helium tank prop, large, with valves, to be orange paint finish; age to appear worn	
	"Balloons" sign approx. 24" wide x 18" high; background is red with white lettering; worn	
	Realistic looking balloons with strings tied to top of helium tank; multi color; approx. 12	
SN-46-P-4	Helium Tank with Sign and Balloons	P-4 Fairs & Festivals
	Helium tank prop, large, with valves, to be orange paint finish; age to appear worn	
	"Balloons" sign approx. 24" wide x 18" high; background is red with white lettering; worn	
	Realistic looking balloons with strings tied to top of helium tank; multi color; approx. 12	
SN-47-P-4	Painted Chalk Line on Floor	P-4 Fairs & Festivals
	Chalk colored painted line on floor; Off-white; 3" wide x 36" long	
	Actual location to be determine my Gesture Technology vendor/projection	
SN-48-P-4	Wooden Box to Conceal Computers	
	Box, styled as crate, sized to properly accommodate Augmented Reality computers	
	Provide adequate vents out of visitor view	

WEST VIRGINIA STATE MUSEUM
ANIMATRONICS

General Notes

1. Drawings for Animatronic Elements (AN) shown in the Scenic Design Package represent "design intent" only and are to be used only as an indication of general size, arrangement, layout and complexity of Animatronic elements

2. All AN are to be fabricated and finished to museum quality level suitable for close up viewing by guests. All AN should appear realistic with visible details, skin, feathers, fur and clothing consistent with the species, periods and eras depicted by the Scenic Design Package and in accordance with visual reference.

3. Contractor shall determine final locations, sizes, methods and materials for all AN elements based on site survey by Contractor and in accordance with site conditions

4. Contractor shall coordinate design and installation of AN elements to accommodate structural, mechanical, HVAC, lighting, audio, video and graphics represented in the design package and in the existing Museum.

5. Contractor shall provide detailed line art development or shop drawings, based on the provided reference and input from the WVDCH, for review and approval.

6. Upon approval of line art or shop drawings, Contractor shall provide color art development for review.

7. Upon approval of color art, Contractor shall provide a full size quality control sample of each type of skin, feathers, fur and clothing for review to indicate color and texture for approval by WVDCH

8. All quality control samples shall be approved by WVDCH prior to commencement of fabrication or ordering. All final AN fabrication, finishing and installation shall be based on and in accordance with approved samples. All samples and submittals become and remain the property of WVDCH.

9. All AN fabrication, installation and associated material shall meet all applicable fire codes including NFPA 101 2003 and must, at a minimum, meet Class B requirements. Inherently flame retardant material shall be used by the Contractor to the greatest extent possible. All flame retardant treatments shall be permanent and not require periodic retreatment.

10. Animatronics shall be constructed with custom welded steel frames and fire retardant body forms

11. Animatronics shall be via industrial rated pneumatics and be realistic with no jerky motions or audible hissing. Provide mock up or representative sample for movement approval.

12. All power, data and pneumatic lines shall be hidden from guest view

13. Human figures shall be full size, have realistic hair with individual implanted hairlines, eyebrows, facial hair and have integral speakers

14. Lip movements, body movements and facial expressions shall be precisely synced to spoken dialogue

15. Eyes realistic for species

16. Animal shall be full size adults of the species indicated unless noted otherwise.

Item Number	Description	Location
AN-01-S-1	John Hale Bust Head rotates side to side and tilts back and forth Mouth moves Eyes blink	S-1 John Hale
AN-02-S-2	Male Cardinal Head, neck, beak and wings move - right wing points Body rotates and tilts Eyes blink 150% of actual size	S-2 River Plains
AN-03-S-6	Male Bust Head rotates side to side and tilts back and forth Mouth moves Eyes blink	S-6 Statehood
AN-04-S-12	Female Conservator Head rotates side to side, tilts back & forth and raises Jaw moves Arms and hands move, wave and raise slightly Body moves slightly Provide casual clothes, lab coat, large glasses and small floppy hat Hair style to hide face from side	S-12 Conservator

WEST VIRGINIA STATE MUSEUM
ANIMATRONICS

Item Number	Description	Location
AN-05-S-8	Male Cardinal Head, neck, beak and wings move - right wing points Body rotates and tilts Eyes blink 150% of actual size	S-8 Company Town
AN-06-S-8	Baby Chick Cardinal with Eggshell Hat Head rotates side to side and tilts back and forth Beak opens Eggshell "hat" wobbles 150% of actual size	S-8 Company Town
AN-07-P-3B	Male Cardinal Head, neck, beak and wings move - right wing points Body rotates and tilts Eyes blink 150% of actual size	P-3B Overlook
AN-08-P-3A	Two Crows Head, neck, beak and wings move Body rotates and tilts Eyes blink	P-3A Transportation
AN-09-P-3A	Hawk Head, neck, beak and wings move Body rotates and tilts Eyes blink	P-3A Transportation
AN-10-P-3A	Hawk Chicks Rustle slightly Beaks move	P-3A Transportation
AN-11-P-3A	Full Grown Owl Head, neck, beak and wings move Body rotates and tilts Eyes blink Head turns 270 degrees	P-3A Transportation
AN-12-P-3A	Three (3) Groups of five (5) Sparrows on Telephone wire Head, neck, beak and wings move Body rotates and tilts	P-3A Transportation
AN-13-P-3A	Full Grown Raccoon Head and neck moves and nods Mouth moves Eyes blink Body moves slightly Hands "flex"	P-3A Transportation
AN-14-P-3A	Rattlesnake Raises head Tongue "flips" Tail rattles Body moves slightly Eyes blink	P-3A Transportation
AN-15-P-1B	Marine Head rotates side to side, tilts back & forth and raises Mouth moves Eyes blink Arms and hands move and raise Body moves slightly Provide period correct WV Marine uniform and rifle	P-1B Harpers Ferry
AN-16-P-1C	Full Grown Raccoon Head and neck moves and nods Mouth moves Eyes blink Body moves slightly Hands "flex"	P-3C Battle of Philippi

WEST VIRGINIA STATE MUSEUM
TREES

General Notes

1. Drawings for Trees (TR) shown in the Scenic Design Package represent "design intent" only and are to be used only as an indication of general size, arrangement, layout and complexity of Trees

2. All TR are to be fabricated, painted and finished to museum quality level suitable for close up viewing by guests. All TR should appear realistic consistent with the species and types depicted by the Scenic Design Package and in accordance with visual reference.

3. Contractor shall determine final locations, sizes, canopy coverage for all TR elements based on site survey by Contractor and in accordance with site conditions

4. Contractor shall coordinate design and installation of TR elements to accommodate structural, mechanical, HVAC, lighting, audio, video and graphics represented in the design package and in the existing Museum.

5. Contractor shall provide detailed line art development or shop drawings, based on the provided reference and input from the WVDCH, for review and approval.

6. Upon approval of line art or shop drawings, Contractor shall provide color art development for review.

7. Upon approval of color art, Contractor shall provide a full size quality control sample of each type of bark and foliage for review to indicate color and texture for approval by WVDCH

8. All quality control samples shall be approved by WVDCH prior to commencement of fabrication or ordering. All final TR fabrication, finishing and installation shall be based on and in accordance with approved samples. All samples and submittals become and remain the property of WVDCH.

9. All TR fabrication, installation and associated material shall meet all applicable fire codes including NFPA 101 2003 and must, at a minimum, meet Class B requirements. Inherently flame retardant material shall be used by the Contractor to the greatest extent possible. All flame retardant treatments shall be permanent and not require periodic retreatment.

Item Number	Description	Location
TR-01-P-1C	Sugar Maple Tree - Summer Grown tree with full canopy across Showpath and 12 feet in length along length of Showpath Canopy density to match existing coverage in existing Showpath, Wilderness Tree trunk is approx. 12" dia.	P-1C Battle of Philippi
TR-02-P-1C	Rhododendron Bushes - summer Match existing in Showpath, Whole New Deal Quantity to cover approximately ten (10) linear feet	P-1C Battle of Philippi

WEST VIRGINIA STATE MUSEUM
FLOORING

General Notes

1. Drawings for Flooring (FL) shown in the Scenic Design Package represent "design intent" only and are to be used only as an indication of general size, arrangement, layout and complexity of Flooring elements
2. All FL are to be fabricated, painted and finished to museum quality level suitable for close up viewing by guests. All FL should appear realistic with visible details consistent with the periods and eras depicted by the Scenic Design Package and in accordance with visual reference.
3. Contractor shall determine final locations, sizes, methods and materials for all FL elements based on site survey by Contractor and in accordance with site conditions
4. Contractor shall coordinate design and installation of FL elements to accommodate structural, mechanical, HVAC, lighting, audio, video and graphics represented in the design package and in the existing Museum.
5. Contractor shall provide detailed line art development or shop drawings, based on the provided reference and input from the WVDCH, for review and approval.
6. Upon approval of line art or shop drawings, Contractor shall provide color art development for review.
7. Upon approval of color art, Contractor shall provide quality control samples of each type of Flooring for review in a size adequate to indicate color and texture for approval by WVDCH
8. All quality control samples shall be approved by WVDCH prior to commencement of fabrication or ordering. All final FL fabrication, finishing and installation shall be based on and in accordance with approved samples. All samples and submittals become and remain the property of WVDCH.
9. All FL fabrication, installation and associated material shall meet all applicable fire codes including NFPA 101 2003 and must, at a minimum, meet Class B requirements. Inherently flame retardant material shall be used by the Contractor to the greatest extent possible. All flame retardant treatments shall be permanent and not require periodic retreatment.

Item Number	Description	Location
FL-01-S-2	Ground Plane Resemble dirt with short grass and weeds to match existing	S-2 River Plains
FL-02-S-4	Grasses at Character Flats Resemble dirt with short grass and weeds transitioning to taller grass and weeds to match existing Increase quantity of random sized grasses near flats	S-4 Fort
FL-03-S-7	Stone and Rubble (3) Resemble muddy construction site with stone rubble and random sized stones up to 4" places near edges of walls and items Place stones to avoid tripping hazard Secure all stones to ground plane	S-7 Railroad
FL-04-P-1B	Ground Plane Resemble dirt with short grass and weeds transitioning to taller grass and weeds to match existing	P-1B Harpers Ferry
FL-05-P-2	Ground Plane Resemble a sandy beach of brown river silt to match existing	P-2 Wheeling
FL-06-P-2	Finish Floor for Gesture Technology As recommended or provided by supplier Provide edging of FL-05-P-2 flooring	P-2 Wheeling
FL-07-P-1C	Ground Plane Resemble dirt with short grass and weeds transitioning to taller grass and weeds to match existing	P-1C Battle of Philipp

WEST VIRGINIA STATE MUSEUM
SCENT

General Notes

1. Scent delivery system shall use replaceable cartridge dry-air technology producing no residue
2. Scent delivery unit shall have adjustable duration and intensity settings and 24-hour timer
3. Contractor to arrange for five (5) years supply of cartridges for each scent
4. Scents shall be as noted on Scenic Design Package and be available from manufacturer's standard scent collec

Item Number	Description	Location
SC-01-S-8	Baking Apple Pie	S-8 Company Town
SC-02-P-4	Freshly Mowed Grass	P-4 Fairs & Festivals
SC-03-P-3A	Freshly Mowed Grass	P-3A Transportation
SC-04-S-5	Freshly Baked Bread	S-5 Cabin

WEST VIRGINIA STATE MUSEUM
AUDIO

General Notes

1. Information for Audio (AD) shown in the Scenic Design Package represents "design intent" only and is to be used as
2. Contractor shall develop scripts and scores for all AD elements and submit to WVDCH for review.
3. Contractor shall determine final lengths of AD elements based on reference information.
4. After approval of the scripts and scores, Contractor shall source voice, effect and musical talent and provide samples to WVCDH for review.
5. After approval of voice and musical talent, Contractor is responsible for completion of all phases of AD production.
6. Contractor shall submit all "rough cut" AD elements for review by WVDCH.
7. After approval of "rough cuts", Contractor shall complete AD production.
8. Contractor to submit "final cuts" to WVDCH for review and approval.
9. Contractor is responsible for the coordination of all AD with animatronics, effects and lighting.
10. Contractor shall submit final AD files to WVDCH in 16-Bit, 48KHz, MONO .WAV or .PCM file format, on

Item Number	Description	Location
AD-01-S-5	Fire crackling noise	S-5 Cabin
AD-02-S-1	John Hale	S-1 John Hale
AD-03-S-2	Wind	S-2 River Plains
AD-04-S-2	Cardinal Dialogue	S-2 River Plains
AD-05-S-2	Modify Existing BGM	S-2 River Plains
AD-06-S-4	Modify Existing BGM	S-4 Fort
AD-07-S-4	Monitor Content	S-4 Fort
AD-08-S-6	Statehood Portrait Dialogue	S-6 Statehood
AD-09-S-6	BGM	S-6 Statehood
AD-10-S-6	Statehood Portrait Dialogue	S-6 Statehood
AD-11-S-8	Cardinal Dialogue	S-8 Company Town
AD-12-S-8	Chirping Baby Birds	S-8 Company Town
AD-13-S-8	BGM	S-8 Company Town
AD-14-P-3B	Cardinal Dialogue	P-3B Overlook
AD-15-P-3B	BGM	P-3B Overlook
AD-16-P-3B	New River Gorge Bridge Background Noise	P-3B Overlook
AD-17-S-12	Conservator Humming	S-12 Conservator
AD-18-S-12	Conservator Dialogue	S-12 Conservator
AD-19-S-7	Danger Voice	S-7 Railroad
AD-20-S-7	Wimpy Fuse	S-7 Railroad
AD-21-S-7	Modest Popping and Cracking Fireworks	S-7 Railroad
AD-22-S-7	Large Explosion	S-7 Railroad
AD-23-P-3A	Crows Cawing	P-3A Transportation
AD-24-P-3A	Owl Hooting	P-3A Transportation
AD-25-P-3A	Sparrow Chirping	P-3A Transportation
AD-26-P-3A	Serenade Session "Country Roads"	P-3A Transportation
AD-27-P-3A	Rattlesnake Tail Rattling	P-3A Transportation
AD-28-P-3A	Hawk Screeching	P-3A Transportation
AD-29-P-1B	Marine Dialogue	P-1B Harpers Ferry
AD-30-P-1B	BGM	P-1B Harpers Ferry
AD-31-P-2	Unseen Ship's Captain	P-2 Wheeling
AD-32-P-2	Unseen Crewmen (Two interacting voices)	P-2 Wheeling
AD-33-P-2	Boiler Room Hissing and Motor Noises	P-2 Wheeling
AD-34-P-2	River Water Lapping at Boat Edge and Dogs Barking	P-2 Wheeling
AD-35-P-1C	Raccoon Chittering	P-1C Battle of Philippi
AD-36-P-1C	Soldier - Left in Tent	P-1C Battle of Philippi
AD-37-P-1C	Soldier - Right in Tent	P-1C Battle of Philippi
AD-38-P-1C	Rushing Water	P-1C Battle of Philippi

WEST VIRGINIA STATE MUSEUM
VIDEO

General Notes

1. Information for Video (VI) shown in the Scenic Design Package represents "design intent" only and is to be used as reference.
2. Contractor shall develop scripts, storyboards and scores for all VI elements and submit to WVDCH for review.
3. Contractor shall determine final lengths of VI elements based on reference information.
4. After approval of the scripts, storyboards and scores, Contractor shall source VI production members, talent and provide a list of works of the key production team members and talent and video clips of talent to WVCDH for review.
5. Contractor to provide photo images of sets, backdrops and furnishings for review by WVDCH
6. After approval of production team, talent, sets, backdrops and furnishings, Contractor is responsible for completion of all phases of VI production.
7. Contractor shall submit all "rough cut" VI elements for review by WVDCH.
8. After approval of "rough cuts", Contractor shall complete VI production.
9. Contractor shall submit "final cut" VI to WVDCH for review and approval prior to video encoding
10. Contractor is responsible for the coordination of all VI with animatronics, effects and lighting.
11. Contractor shall submit final VI files to WVDCH in MPEG-2 Video and Audio Muxed Program Stream format. Reference the Alcorn McBride Digital Video Binloop manual for complete Transport Stream specifications and supported bitrates and encoded source file specifications. These files shall be delivered on Compact Flash cards compatible with the Alcorn McBride Digital Binloop, plus backup files on CD or DVD data discs. Backup files shall be labeled by area in the directory and the file name shall be the item number.
12. The Contractor shall provide a full scale mock up of all Gesture Technology and Augmented Reality pieces and systems for Owner and Architect approval prior to final production and installation. Mock ups may be at the Contractor's fabrication shop or on site at the Contractor's option. Each mock up should be illustrative of the full range of interactivity and function, including resting state, initiation, interaction/play, resolution and return to resting state. If the initial mock up is found unacceptable, the Contrator shall provide a second mock-up and demonstration of the revised Gesture Technology or Augmented Reality element. Second mock-ups if necessary shall be at the project site.
13. The Contractor shall mock up all AV projection and video pieces for Owner and Architect approval prior to final installation. Mock ups may be at the Contractor's fabrication shop or on site at the Contractor's option. Each mock up should be illustrative of the required performance and conditions under which the piece will be presented in the museum. If the initial mock up is found unacceptable, the Contrator shall provide a second mock-up and demonstration of the revised AV projection or video element. Second mock-ups if necessary shall be at the project site.

Item Number	Description	Location
VI-01-S-4	Floor Mounted Monitors	S-4 Fort
VI-02-P-4	Gesture tech	P-4 Fairs & Festivals
VI-03-P-4	Augmented Reality	P-4 Fairs & Festivals
VI-04-P-1A	Old Man Character	P-1A John Brown
VI-05-P-1A	Young Woman Character	P-1A John Brown
VI-06-P-1A	Armory Worker Character	P-1A John Brown
VI-07-P-1A	Slave Character	P-1A John Brown
VI-08-P-2	Interactive Gesture Technology	P-2 Wheeling
VI-09-P-2	Projected Silhouettes of Men working	P-2 Wheeling
VI-10-P-1C	Silhouette of Soldier - Left	P-1C Battle of Philippi
VI-11-P-1C	Silhouette of Soldier - Right	P-1C Battle of Philippi

WEST VIRGINIA STATE MUSEUM

SHOW TECHNOLOGY

LOW VOLTAGE SYSTEMS INSTALLATION

PART 1 - GENERAL

A. This information is provided as a specification for an enhancement to the existing Audio - Video playback and informational system at the West Virginia State Museum. This specification details the requirements and deliverables to complete documentation, procurement, integration, installation and programming of a functional audiovisual system.

B. The system shall display pre-produced audio, informational video and adds animated characters throughout the “show path” for guests. The system is currently programmed as a semi-automated looping show, with sequenced startup and shutdown via the control system. Enhancements include a number of sub system animation controllers that interface through basic dry contact closures to the existing AV control system.

C. The system also controls the Show Lighting System, for show elements and setting levels and presets for the scenes, including a night mode and a clean-up mode for maintenance. Additional programming & adjustment of the lighting levels will be required and triggered by most of the sub system animation controllers.

D. All low voltage Audiovisual and Control cabling shall be provided by the Contractor and installed within conduit or free-run within the facility by the General Contractor. Cable excess “tails” for each end of every cable shall be determined and specified by the Contractor. The Contractor shall terminate the Audiovisual and Control cable. See Part 3 for termination details.

F. Sources include existing Digital Audio and Video Binloops that will require additional repro cards for the new enhancements. Coordinate testing of media encoding needed for the video creation with the Museum’s Media Producer.

G. All electronic equipment are housed in 2 steel racks in the electrical equipment room (EER). An additional equipment rack of equal size shall be required for the additional playback and processing equipment and will require the relocation of equipment from an existing 1/2 height rack currently installed within the Museum’s EER. All incoming and outgoing conduit low voltage will be landed in this room in the appropriate location for the equipment rack. All cabling and terminations that start and end within the equipment racks that are within the same equipment room, shall be provided and terminated by the Contractor.

H. All Audio and Video media content shall be provided to the Contractor by the Museum’s Media Producer. This content shall be delivered on CD or DVD format data discs and will need to be transferred to the appropriate size and speed of Compact Flash Memory cards for the digital media players. The transfer of the media files and procurement of the appropriate size and speed of Compact Flash Memory cards shall be the responsibility of the Contractor.

I. Refer to the individual Items Technology specifications for cabling and specific equipment requirements.

PART 2 - DELIVERABLES

2.1 Upon contract award, and following owners installation schedule, Contractor shall:

A. Procure equipment.

B. Prefabricate any necessary subassemblies, (equipment rack, speaker and projection hanging systems, console harness, etc.)

C. Provide and install field wiring, not including power and any conduit installation, pulling sound wire in provided conduit, unless arrangements are made with electrical contractor to provide this also.

D. Install suspended video walls and suspended monitors in a safe manor using guidelines described in that appropriate section of this document. Certified rigging documents may be required

E. Coordinate with Owner's General Contractor and their Subcontractors to facilitate the sound and video system installation in a timely fashion.

F. Provide as-built documentation to Owner, including wiring labeling, signal path and connection diagrams on a minimum "C" sized plot.

G. Provide Owner or their appointed representative with operational instructions and documented training on system functions and equipment.

H. Provide owner with a 1 year installation warranty from date of completion, to include correction due to installation defects, installation technician's maladjustment of equipment, provide assistance in acquiring replacement equipment in the event of equipment failure under manufacturer's warranty.

PART 3 - WIRING STANDARDS

3.1 Low Level Audio Signals

A. The low level signal wiring should conform to the following NSCA standards:

1. Red (sometimes white) line - Signal "hot" or " + ".

2. Black wire - Signal "cold" or " - ".

3. Shield - Signal ground or audio signal common, NOT chassis ground.

4. All shield wires when dressed onto equipment connections shall be insulated with heat shrink tubing or equivalent insulating material.

5. All low level signal wires shall be equal or better than in quality to the Belden 1503A type 22ga. twisted, shielded single pair audio cable.

6. All wiring in and out of equipment connections shall include a service loop of at least 24" to permit removal of equipment without disconnecting signal wires. This is to facilitate adjustment and testing of equipment outside the equipment rack, while still being utilized in the signal path.

7. All rack internal equipment signal wiring shall be housed in the appropriate size plastic Panduit enclosed cable trays, with entrance and exit of the wiring at the nearest location to each piece of equipment. Wires common to the same piece of equipment shall be ty-wrap bundled together.

8. All wiring shall follow a numerically sequenced standard to aid in easy location and troubleshooting of the signal path. A chart of all wiring in the system shall be provided including documentation as-builts flow drawings with each signal wire numbered and identified.

3.2 High Level Audio Signals

A. The high level (speaker) wiring shall also follow NSCA standards:

1. Utilize spade type crimp connections on all amplifier outputs.

2. Signal wire shall be equal to or better than the Belden 5100 14ga. twisted pair jacketed cabling.

3. Black wire - signal “low” or “ - ”.

4. White wire - signal “high” or “ + ”.

5. All cabling shall be tywrap bundled to keep a neat appearance within the equipment rack.

6. All wiring shall follow a numerically sequenced standard to aid in easy location and troubleshooting of the signal path. A chart of all wiring in the system shall be provided including documentation as-builts flow drawings with each signal wire numbered and identified.

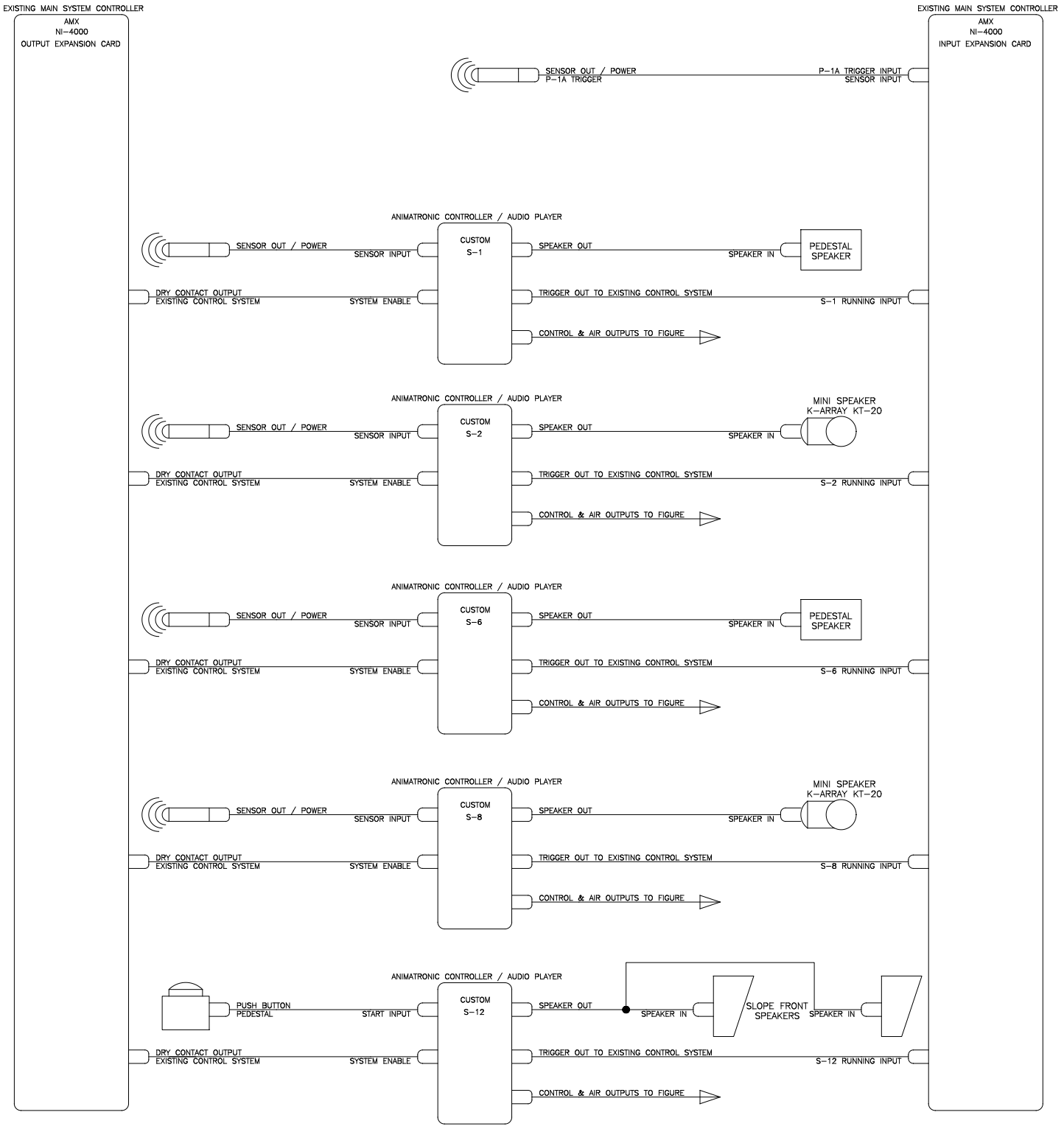
3.3 Video System Cabling

A. The Video System Cabling:

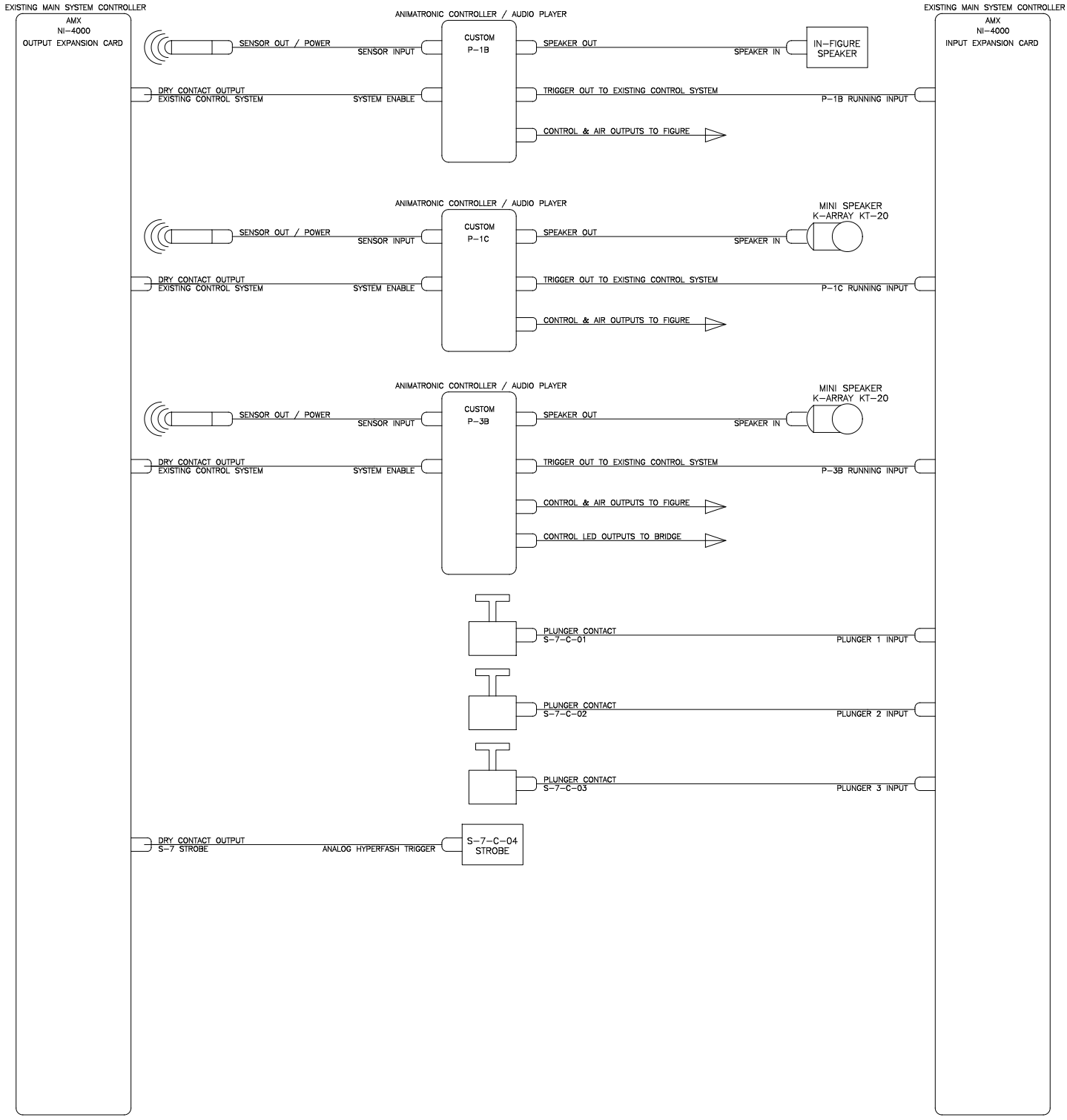
1. Utilize BNC or RCA compression connectors suitable and matched in size to the cable diameter and type.

2. All balan – type video signals requires low skew CAT6 media twist cables and proper EIA 568B color code sequencing into RJ45 plug terminations.

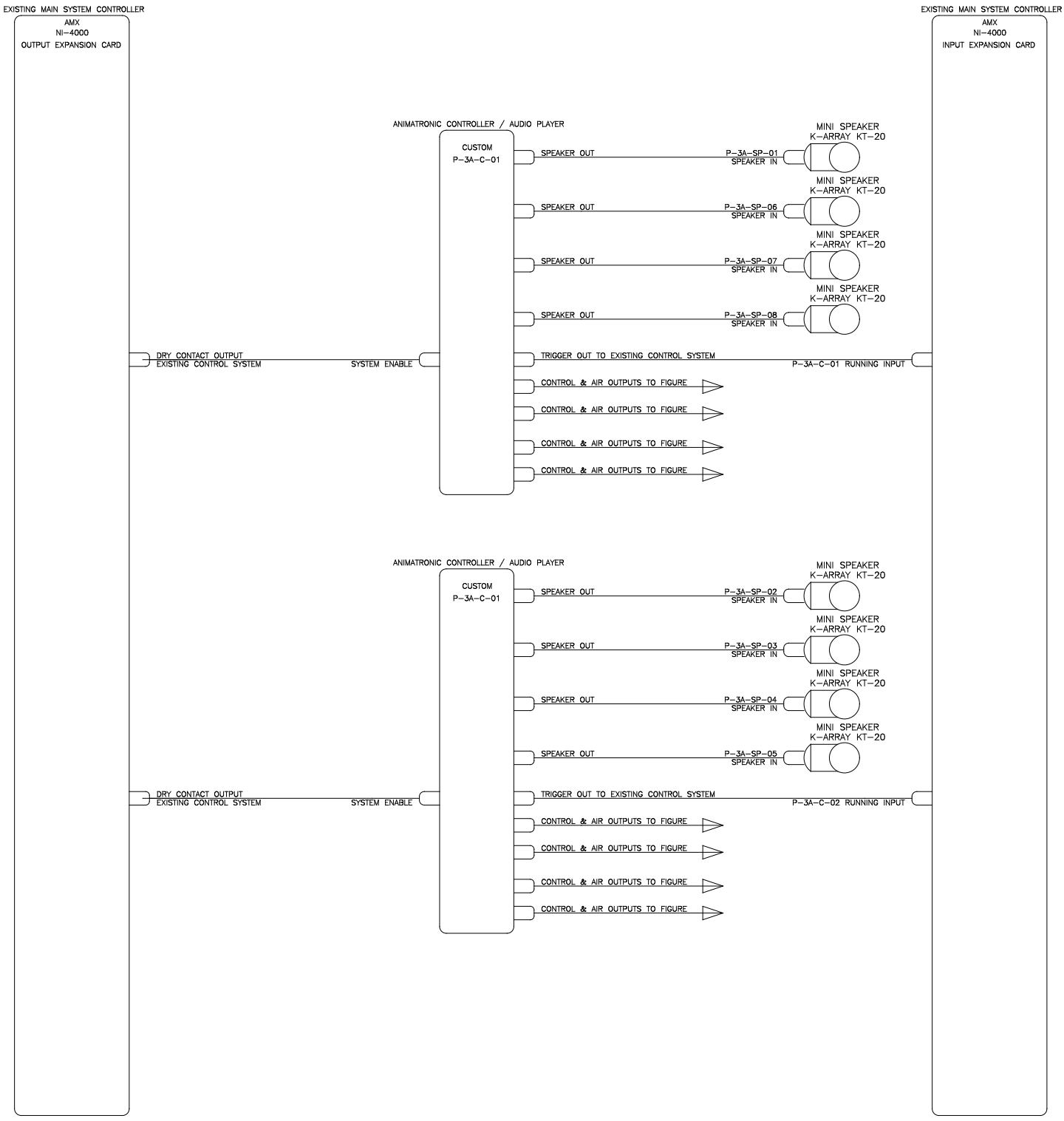
Control Diagram 1 of 4



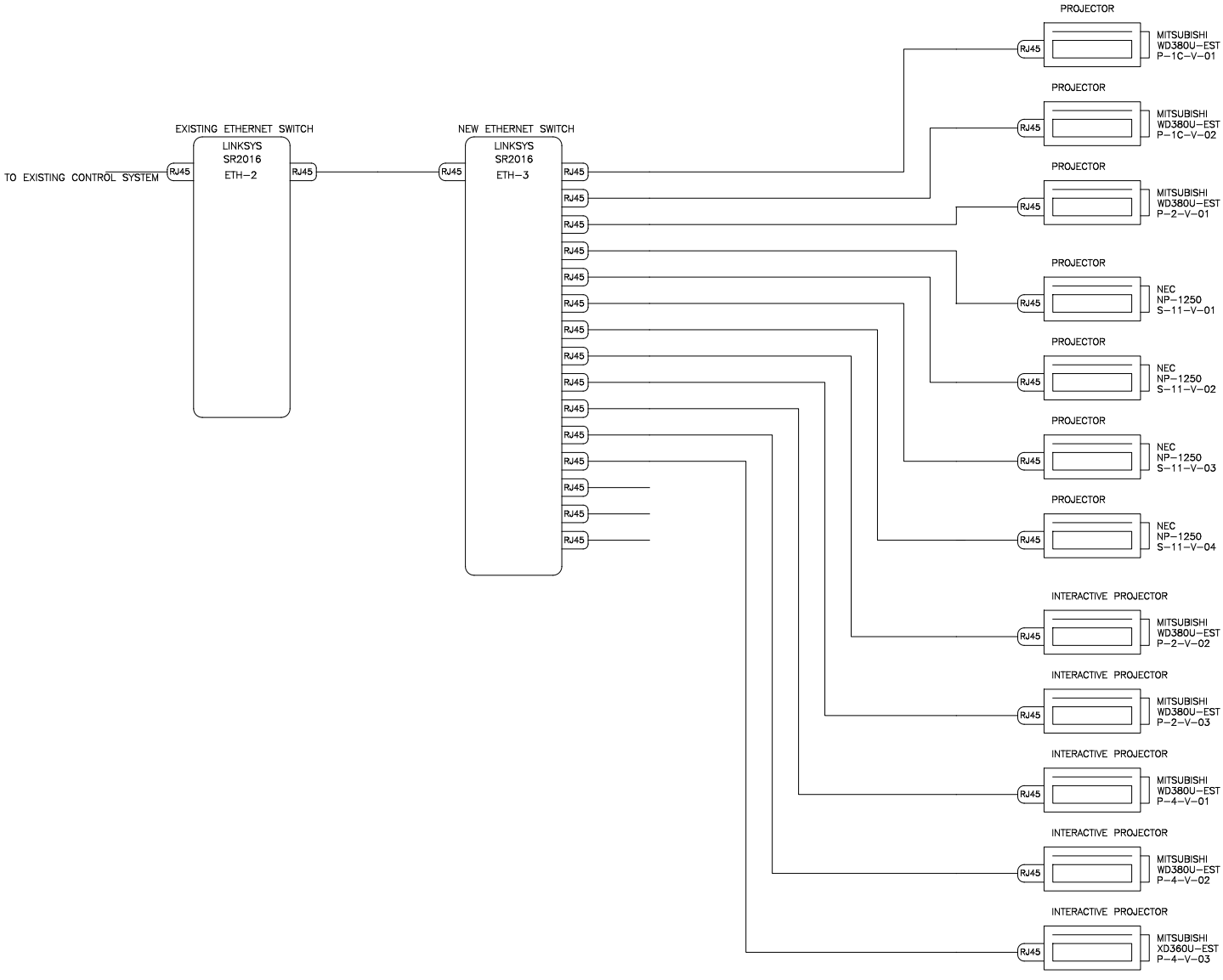
Control Diagram 2 of 4



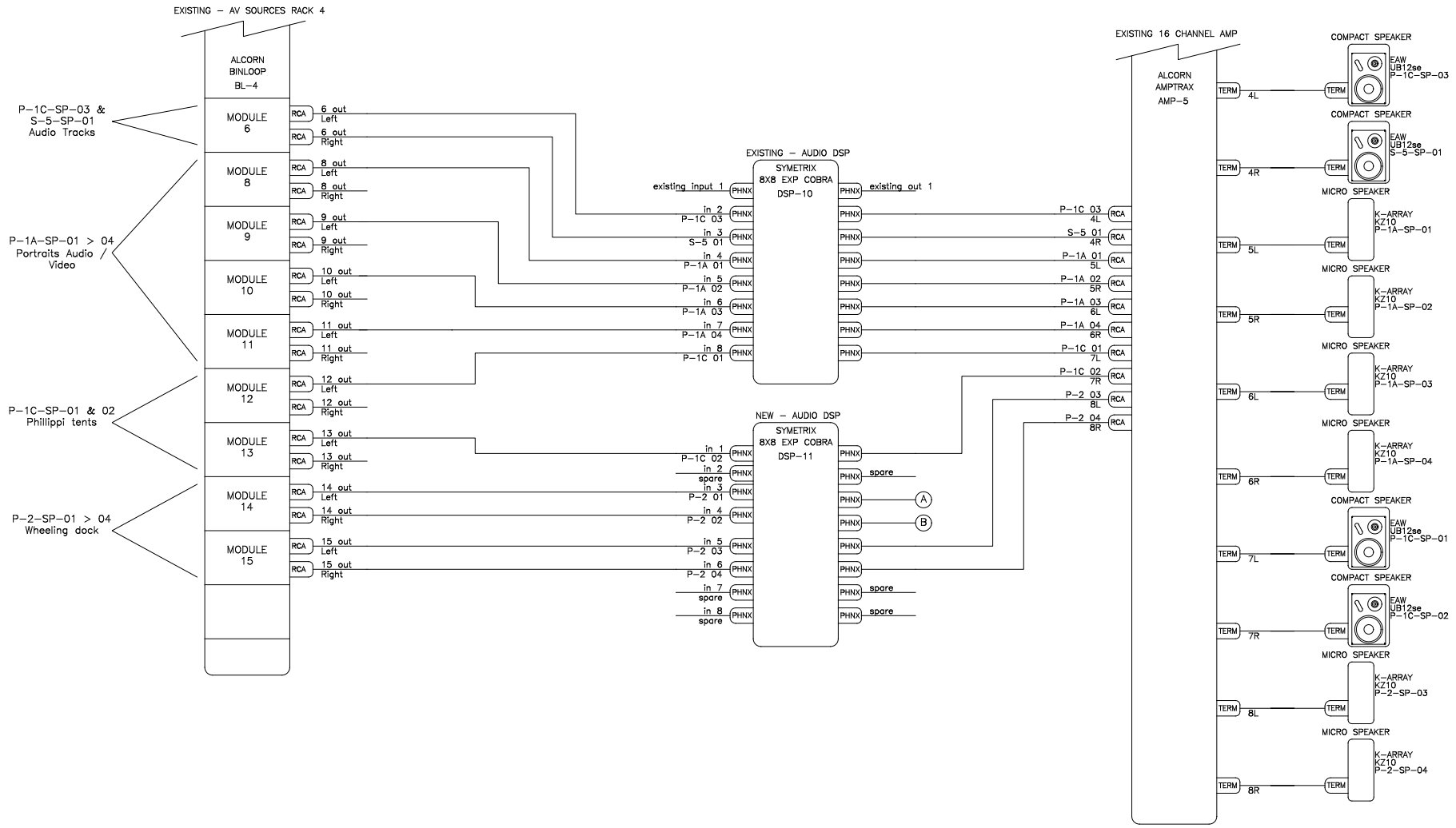
Control Diagram 3 of 4



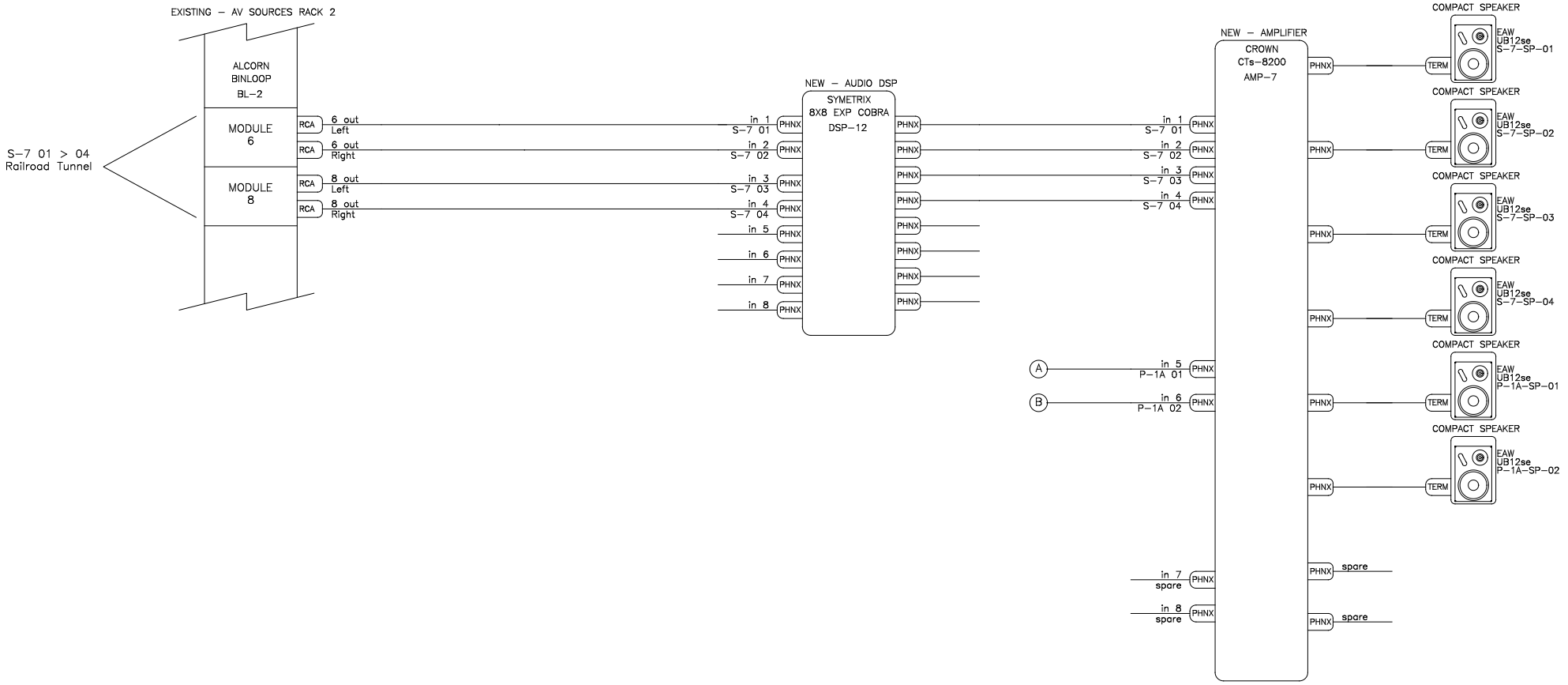
Control Diagram 4 of 4



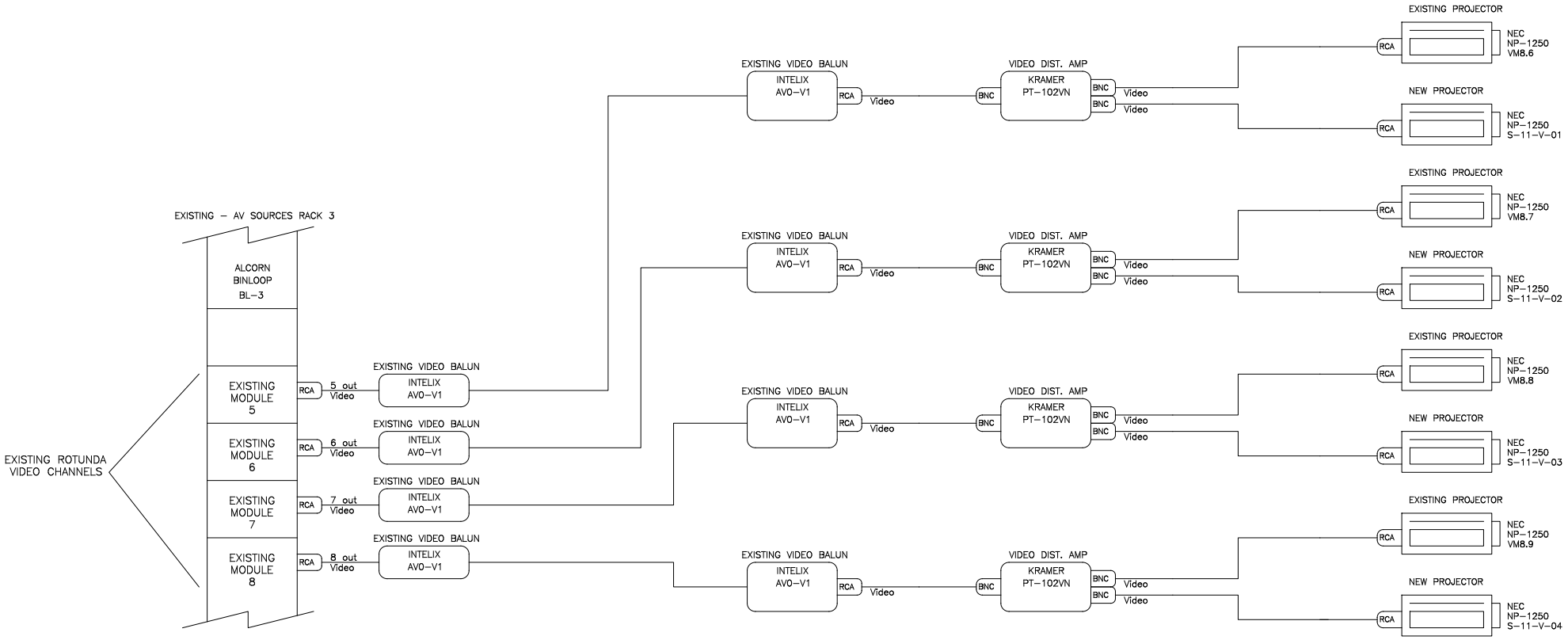
Audio Diagram 1 of 2



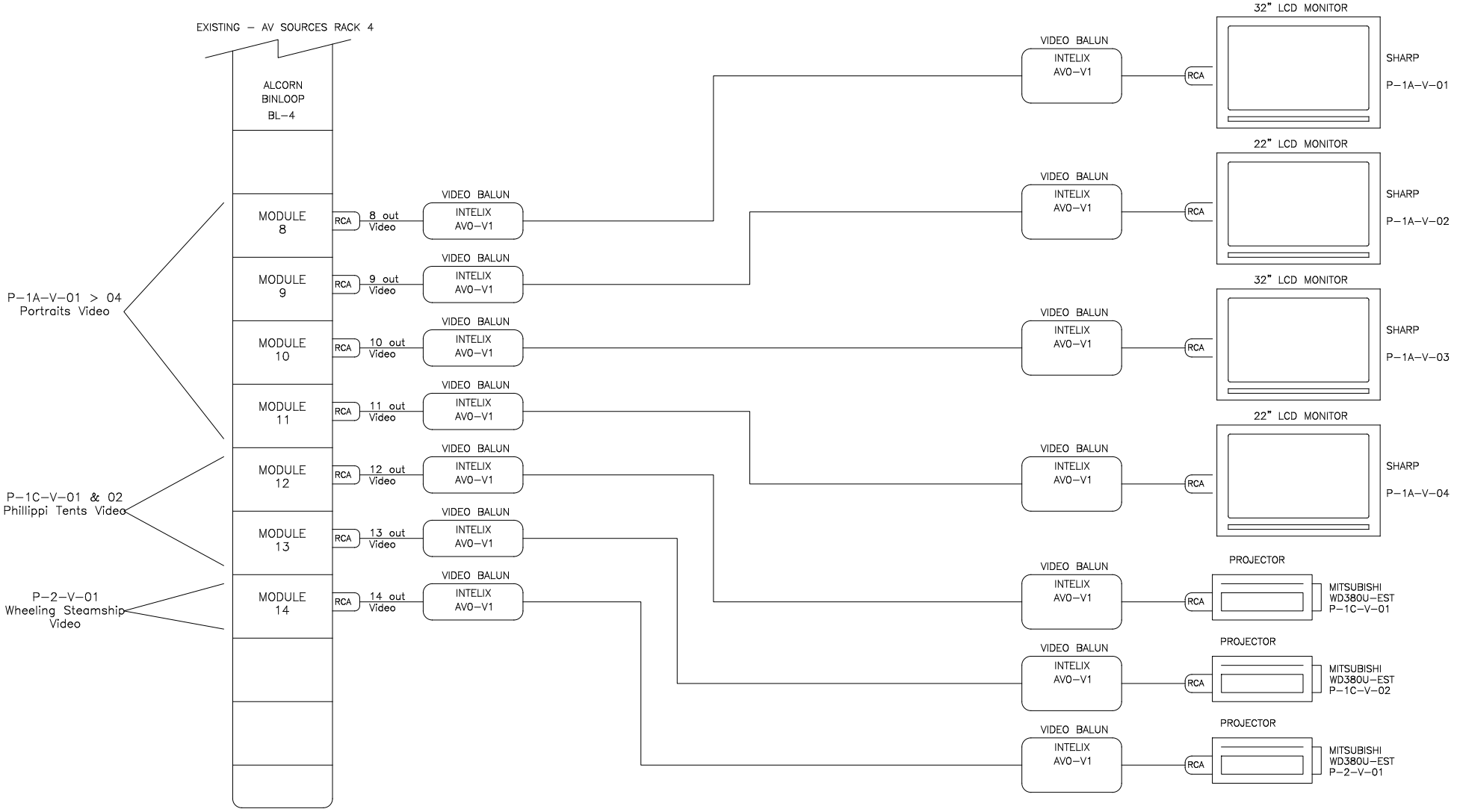
Audio Diagram 2 of 2



Video Diagram 1 of 2



Video Diagram 2 of 2



Express Cobra

SymNet Express Cobra is a family of 19" rack-mountable digital signal processors (DSP) that are setup and controlled by SymNet Designer software. They are ideal for audio applications such as churches, conference rooms, courtrooms, night clubs and many others. ARC Wall panels easily integrate with Express hardware and provide simple user control of the system.

There are four analog I/O options available for the Express line: 12x4, 4x12, 8x8, and 4x4. Express devices also employ the industry-standard CobraNet® technology to share audio between devices supporting 16 inputs and 16 outputs of CobraNet audio over Ethernet in addition to the analog I/O. Express devices are intended for single device installations as well as installations with modest expansion requirements.

Devices are initially configured through the RS-232 port on the rear panel. This same port is used to connect to external control systems from AMX, Crestron, and others. Once the system is initially configured, Express devices can be addressed and controlled over Ethernet.

Any of the ARC Wall Panels can be connected via CAT5 cable to an RJ-45 jack on the rear panel. One channel of analog audio can be routed to or from the wall panel over the CAT5 cable for simple paging or monitoring needs. Express also includes an RS-485 port for extending the ARC and external control capacity.

Express 12 x 4 Cobra

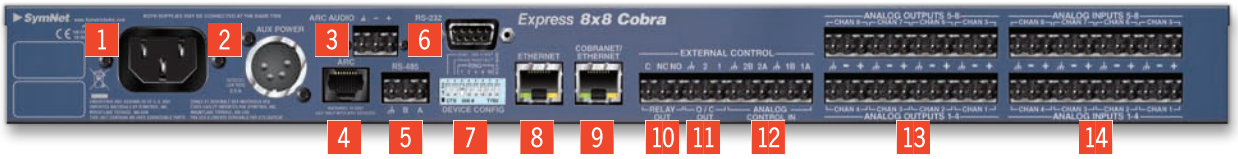
Express 4 x 12 Cobra

Express 4 x 4 Cobra

Specifications

GENERAL SPECIFICATIONS	
Processors	2 x Analog Devices SHARC 21161N @ 100 MHz SIMD
Raw processing capacity	200 MIPS, 800 MFLOPS sustained
Analog control inputs	0-5 VDC
Recommended external control potentiometer	10k Ohm, linear
RS-232 host serial I/O	115.2 or 57.6 kbaud, 8 data bits, 1 stop bit, no parity, no flow control wired straight-through, only pins 2, 3, and 5 required
RS-232 accessory serial I/O	38.4 kbaud (default), 8 data bits, 1 stop bit, no parity, no flow control wired straight-through, only pins 2, 3, and 5 required
RS-485 serial I/O	38.4 kbaud (default) 8 data bits, 1 stop bit, no parity, no flow control wired in parallel with STP cable.
Ethernet/CobraNet Cable	Standard CAT5, maximum device to device length = 100 meters
ARC Cable	Standard CAT5, distance dependent upon load.
Maximum devices per SymLink Ring	1
Maximum SymLink Rings	31
Maximum stored presets	1000

AUDIO SPECIFICATIONS	
Converter Type	24-bit Sigma Delta
Sampling Rate	48 kHz, +/- 100 ppm
Frequency Response	20-20 kHz, +/- 0.5 dB
A/D dynamic range	> 110 dB, A-weighted
D/A dynamic range	> 110 dB, A-weighted
Total THD+ Noise	< 0.005% @ 1 kHz, -1 dBFS
Delay memory	43 mono seconds
Input impedance	6.67k Ohms, balanced
Output impedance	204 Ohms, balanced
Maximum input level	+29 dBu with 6 dB pad, +23 dBu w/o pad
Maximum output level	+24 dBu, 100k Ohms; +21 dBu. 600 Ohms
Mic preamp EIN	-129 dBu typical, 22-22 kHz, A-weighted
Phantom power (per input)	+48 VDC, 10 mA
Input CMR	> 70 dB @ 60 Hz
Channel separation	> 100 dB, in through out @ 1 kHz



1. **Main Power:** Accepts power from detachable IEC power cable (100-240 VAC, 50-60 Hz, 60 Watts max).
2. **Aux Power:** Accepts power from Symetrix model PS-7 or user-supplied auxiliary power connection (24 VDC, 2.5 Amps, 60 Watts max).
3. **ARC Audio:** Splits a single analog line level audio signal off of the ARC port. Can be wired to a line level analog input or output jack for remote audio over CAT5.
4. **ARC:** Distributes power and RS-485 data to one or more ARC devices.
5. **RS-485:** Connects to a Control I/O, ARC-PS, ARC or other Symetrix SymNet family RS-485 controller, wired in parallel (A to A, B to B and GND to GND) using shielded twisted pair. Port Settings: 38.4 kbaud (default), 8 data bits, 1 stop bit, no parity, no flow control.
6. **RS-232:** Serial communications interface for SymNet Designer on the host PC or a 3rd party accessory controller. (Mode is determined by the "RS-232: Host / Acc" mode switch.) Port Settings (Host): 115 or 57.6 kbaud, 8 data bits, 1 stop bit, no parity, no flow control. Port Settings (Acc): 38.4 kbaud (default), 8 data bits, 1 stop bit, no parity, no flow control.
7. **Device Config:** Configures the RS-232 port mode, RS-232 port host mode baud rate and Ring Number (device address).
8. **Ethernet:** 10/100 Base-T Ethernet port for SymNet Designer host control over IP. IP control must be setup from SymNet Designer via RS-232 first for security.
9. **CobraNet/Ethernet:** 10/100 Base-T Ethernet port for CobraNet audio, 16 send and 16 receive channels. (Future software versions may support SymNet Designer host control over IP+CobraNet on this same port.)
10. **Relay Out:** 1 SPDT relay rated at 3 Amps, 24 VDC, resistive; 0.3 Amps, 60 VDC, resistive and can be wired normally open or normally closed. This relay can also be used for power failure detection or emergency alarm system integration.
11. **O/C Out:** 2 open collector outputs with a paired common ground pin. O/C outputs go low (0V) when active, and are internally pulled high (5V) when inactive and can drive external LED indicators directly.
12. **Control In:** 2 analog control inputs able to be used as 2 potentiometer inputs, 2 mechanical rotary encoder inputs, or as 4 switch inputs (+5 VDC reference voltage supplied).
13. **Analog Outputs:** 4, 8 or 12 analog line level audio inputs with individually software-selectable level of -10 dBV or +4 dBu.
14. **Analog Inputs:** 4, 8 or 12 analog mic / line level audio inputs with individually software-selectable phantom power and level of -50 dBu, -40 dBu, -20 dBu, -10 dBV or +4 dBu.

Mechanical Data

Item	Specifications	Remarks
Space Required	1U (WDH: 48.3 cm x 27.4 cm x 4.37 cm / 19 in x 10.8 in x 1.72 in). Depth does not include connector allowance.	Allow at least 1 inch additional clearance for rear panel connections. Additional depth may be required depending upon your specific wiring and connections.
Electrical	100 to 240 VAC, 50-60 Hz, 60W maximum.	No line voltage switching required.
Ventilation	Maximum recommended ambient operating temperature is 30 C / 86 F.	Fan on equipment right pulls hot air out of device. Air intake at equipment left. Ensure that the left and right equipment sides are unobstructed (5.08 cm, 2 in minimum clearance). The ventilation should not be impeded by covering the ventilation openings with items such as newspapers, tablecloths, curtains, etc.
Shipping Weight	6 kg (12 lbs.)	

Architect and Engineer Specifications: SymNet Express Cobra.

The series of four DSP audio matrix devices shall include four different configurations of balanced mic/line inputs and balanced line outputs on plug-in barrier-strip connectors. These configurations shall be 12x4, 4x12, 8x8, and 4x4. Each shall be offered with CobraNet compatibility. Additionally each device shall include two analog control inputs, one open collector output, and one relay output on plug-in barrier-strip connectors, ARC interconnect on one RJ-45 connector, ARC Audio on one plug-in barrier strip connector, and 24 VDC backup power on one 4-pin male XLR connector. The devices shall include one RJ-45 connector for CobraNet network audio. Audio inputs and outputs shall be analog, with internal 24-bit A/D & D/A converters operating at a sample rate of 48 kHz. All internal processing shall be digital (DSP). Software shall be provided for creating/ connecting DSP system components within each hardware device. Available system components shall include (but not be limited to) various forms of: mixers, equalizers, filters, crossovers, dynamics/gain controls, routers, delays, remote controls, meters, generators, onboard logic, and diagnostics. Ethernet or serial communications shall be utilized for software control and configuration. After initial programming, processors may be controlled via dedicated software screens, third-party RS-232 control systems, and/or optional analog or RS-485 remote control devices. A designer software application shall operate on a Windows computer, with network card installed, running Windows® 98/2000/XP. **The DSP series shall be CE marked, CSA tested to UL 60065.**

The DSP series shall be SymNet Express Cobra.

CTs Series Multi-Channel

Features

- Selectable constant-voltage (70V/100V) or low-impedance (4/8 ohm) operation for each channel pair (channel pair must be operated in Bridge mode for 100V
- FIT (Fault Isolation Topology) circuitry isolates faults within affected channels
- 5 Year No Fault Warranty with 1 Year Advance Replacement Program
- TLC protection circuitry protects the amplifier from excessive heat by subtly and dynamically reducing the gain only when necessary to reduce heat levels
- Comprehensive array of indicators including Power and Data, along with Bridge, Ready, Signal, Clip, Thermal and Fault for each channel, provide accurate diagnostics
- A fixed 35-Hz (70-Hz in CTs 4200) high-pass filter per channel pair is automatically inserted when the mode switch is set to either of the constant-voltage settings. The high-pass filter corner frequency in the CTs 8200 can be set to 70 Hz, or bypassed, with a service option

CTs MULTICHANNEL SERIES

CTs 8200

Architectural & Engineering Specifications

CTs 8200 (120 V, 60 Hz models)

The power amplifier shall be a solid-state eight-channel model employing Multi-Mode® (AB+B) output circuitry.

The amplifier shall contain protection from shorted, open and mismatched loads, general overheating, DC, high-frequency overloads, under/over voltage, and internal faults.

The amplifier shall contain FIT (Fault Isolation Topology), which isolates channel-specific faults and prevents them from affecting remaining channels.

If an amplifier channel starts to overheat, the Thermal Level Control (TLC) circuit shall engage that channel's input compressor in an amount proportional to the amount of overheating, in order to generate less heat. If the channel becomes too hot for safe operation, the channel shall shut off, and the Thermal Indicator for that channel shall flash brightly to alert the user that a state of thermal stress or overload has caused the channel to shut down.

The front-panel control shall be a power switch.

Rear-mounted controls shall include Channel Level Controls and a Mode Switch. The Mode Switch (used on each consecutive pair of channels) is a four-position switch which selects among Dual 8/4 ohms, Dual 70V, Bridge-Mono 16/8 ohms, and Bridge-Mono 100V.

The recommended load impedance in Dual mode shall be 4/8 and 25 ohms (70V). The load impedance in Bridge-Mono mode shall be 8/16 ohms and 50 ohms (100V). The amplifier shall be safe when driving any kind of load, including highly reactive ones.

Rear-mounted output connectors shall be one four-pole terminal strip for every two channels with a touch-proof cover. Rear-mounted input connectors shall be removable Phoenix-style barrier connectors for balanced input.

The amplifier shall be fully compatible with and shall provide appropriate input cables and connectors for Crown® VCA-MC8 module.

Front panel indicators shall include a yellow Bridge-Mode Indicator (one per channel pair) that illuminates when the channel pair's Mode Switch is set to the "Bridge" position (and flashes if the Mode Switch is changed while the amplifier is powered up, indicating that the amplifier must be powered off and on to reset the Mode), a green Ready Indicator (one per channel) that illuminates when the channel is initialized and ready to produce audio output, a green Signal Indicator (one per channel) that illuminates to indicate the presence of input signals above –40 dBu, a red Clip Indicator that illuminates when the THD of the channel's output signal rises to a level typically considered as the onset of audible clipping (and illuminates during Thermal Level Control or input overload), a red Thermal Indicator (one per channel) that flashes when a state of thermal stress or overload has caused the channel to shut down (and flashes in all channels if the power supply goes into thermal overload), a red Fault Indicator (one per channel) that flashes when a fault condition has occurred in the channel, and a blue Power Indicator that illuminates when the amplifier has been turned on and AC power is available (and illuminates when the amplifier shuts off due to an under-/over-voltage condition on the AC mains).

The power amplifier shall meet or exceed the following performance criteria. Input sensitivity for rated output: 1.4 V. Rated output with eight channels driven in Dual mode with 0.1% THD (20 Hz to 20 kHz): 175 watts per channel into 4 ohms; 155 watts per channel into 8 ohms, and 185 watts per channel (70V). Rated output in Bridge-Mono mode with four channel pairs driven at 0.1% THD (20 Hz to 20 kHz): 350 watts per channel pair into 8 ohms; 310 watts per channel pair into 16 ohms, and 185 watts per channel pair (100V). Signal to Noise Ratio below rated power (20 Hz to 20 kHz): 100 dB unweighted. Phase Response: ±35 degrees from 10 Hz to 20 kHz at 1 watt. Frequency Response: 20 Hz to 20 kHz, ±0.5 dB at 1 watt into 8 ohms per channel in Dual mode. Damping Factor: greater than 180 from 10 to 400 Hz. Crosstalk (below rated power, 20 Hz to 1 kHz): greater than 80 dB. Intermodulation Distortion (60 Hz and 7 kHz at 4:1, from 163 milliwatts to full bandwidth power): less than 0.05% typical. Total Harmonic Distortion at 1 watt from 20 Hz to 20 kHz: less than 0.05%. Common Mode Rejection (20 Hz to 1 kHz): greater than 50 dB. DC Output Offset (shorted input): less than 5 mV. Maximum Input Level (before input compression): + 22 dBu rms. Power Draw at Idle (120 VAC mains, all channels in 4/8 ohm mode): 58 watts. Power Draw at Idle (120 VAC mains, all channels in 70V mode): 77 watts.

The amplifier chassis shall be constructed of steel with a durable black finish and shall be designed for continuously variable-speed forced-air ventilation from the front panel to the back panel.

The dimensions of the amplifier shall allow for 19 inch (48.3 cm) EIA standard (RS-310-B) rack mounting. The amplifier shall be 5.25 inches (13.3 cm) tall, and 16.25 inches (41.3 cm) deep behind the rack-mounting surface.

The amplifier shall weigh 36 pounds, 6 ounces (16.5 kg).

The amplifier shall be designated the Crown CTs 8200.

A Harman International Company

Crown International
P.O. Box 1000
Elkhart, IN 46515-1000
TEL: 574-294-8200
FAX: 574-294-8FAX
www.crownaudio.com

Specifications

	CTs 4200	CTs 8200
Channels	4	8
Sensitivity	1.4V	1.4V
Signal to Noise Ratio (below rated power 20Hz to 20kHz, Unweighted)	100dB	100dB
Total Harmonic Distortion (THD) (full rated power, 20Hz - 20kHz)	< 0.05%	< 0.05%
Intermodulation Distortion (from 0dB down to -40dB)	< 0.05%	< 0.05%
Frequency Response (at 1W into 4/8 ohms)	± 0.5dB	± 0.5dB
Phase Response (at 1 watt, 10 Hz - 20 kHz)	± 35°	± 35°
Crosstalk (below rated power 20Hz to 1kHz)	> 80dB	> 80dB
Common Mode Rejection (20Hz to 1Khz)	> 50dB	> 50dB
Maximum Input Level (before input compression)	+20dBu	+20dBu
Load impedance	70V (4/8/16 Ohm)	70V (4/8/16 Ohm)
Voltage Gain (at maximum level settings) (8/4 ohm operation)	20:1 (26dB)	20:1 (26dB)
Power Draw at Idle (120VAC mains: standby mode)	58W	58W

General

Dimension (H x W X D)	3.5" x 19" x 16.25"	5.25" x 19" x 16.25"
Net Weight	27 lbs 8 oz	36 lbs 6 oz
Net Shipping Weight	32 lbs	47 lbs

CTs 4200

Dual	Maximum Average Power in watts with 0.1% THD.	
4 Channels Driven	1 kHz	20 Hz–20 kHz
4-ohm (per ch.)	**260W**	**215W**
8-ohm (per ch.)	**180W**	**190W**
70V (per ch.)	**220W**	**220W***
1 Channel Driven	1 kHz	20 Hz–20 kHz
4-ohm (per ch.)	**270W**	**225W**
8-ohm (per ch.)	**220W**	**210W**
70V (per ch.)	**250W**	**245W***
Bridge-Mono		
2 Channel-Pairs Driven	1 kHz	20 Hz–20 kHz
8-ohm (per ch. pair)	**520W**	**430W**
16-ohm (per ch. pair)	**400W**	**380W**
100V (per ch. pair)	**220W**	**220W***
1 Channel-Pair Driven	1 kHz	20 Hz–20 kHz
8-ohm (per ch. pair)	**560W**	**450W**
16-ohm (per ch. pair)	**440W**	**420W**
100V (per ch. pair)	**250W**	**245W***

* Constant Voltage full bandwidth power ratings support 100Hz - 20kHz due to automatic High-Pass Filters.

CTs 8200

Dual	Maximum Average Power in watts with 0.1% THD.	
4 Channels Driven	1 kHz	20 Hz–20 kHz
4-ohm (per ch.)	**200W**	**175W**
8-ohm (per ch.)	**160W**	**155W**
70V (per ch.)	**200W**	**285W***
1 Channel Driven	1 kHz	20 Hz–20 kHz
4-ohm (per ch.)	**270W**	**230W**
8-ohm (per ch.)	**220W**	**220W**
70V (per ch.)	**250W**	**230W***
Bridge-Mono		
2 Channel-Pairs Driven	1 kHz	20 Hz–20 kHz
8-ohm (per ch. pair)	**400W**	**350W**
16-ohm (per ch. pair)	**320W**	**310W**
100V (per ch. pair)	**200W**	**185W***
1 Channel-Pair Driven	1 kHz	20 Hz–20 kHz
8-ohm (per ch. pair)	**540W**	**460W**
16-ohm (per ch. pair)	**440W**	**440W**
100V (per ch. pair)	**250W**	**230W***

* Constant Voltage full bandwidth power ratings support 100Hz - 20kHz due to automatic High-Pass Filters.

Crown's Five-Year, No-Fault, Fully Transferable Warranty

Crown offers a Five-Year, No-Fault, Fully Transferable Warranty for every new Crown amplifier—an unsurpassed industry standard. With this unprecedented No-Fault protection, your new Crown amplifier is warranted to meet or exceed original specifications for the first five years of ownership. During this time, if your amplifier fails, or does not perform to original specifications, it will be repaired or replaced at our expense. About the only things not covered by this warranty are those losses normally covered by insurance and those caused by intentional abuse. And the coverage is transferable, should you sell your amplifier. See your authorized Crown dealer for full warranty disclosure and details. For customers outside of the USA, please contact your authorized Crown distributor for warranty information or call 574-294-8200.

crown® by HARMAN

Specifications subject to change without prior notice. Latest information available at www.crownaudio.com.

netlinx® control cards and net modules

NetLinx Control Cards serve as flexible, modular building blocks for creating advanced control applications. Up to 12 Control Cards can be inserted into the NetLinx CardFrame's front-access control slots, or supplied in a NetModule enclosure for stand-alone operation. Control Cards can meet a wide variety of control needs, including multi-port RS-232/422/485, IR/Serial, Input/Output, Relay, Voltage, and Volume control. Every Control Card includes a full array of LED status indicators at the front, easily viewable from the NetLinx enclosure's translucent cover. Whether in a CardFrame or NetModule, NetLinx Control Cards operate directly on the high-speed ICSNet data bus.

AMX®

netlinx® control cards and net modules

DUAL COM PORTS, RS-232/422/485

- Provides 2 RS-232/422/485 data control ports and front-panel feedback

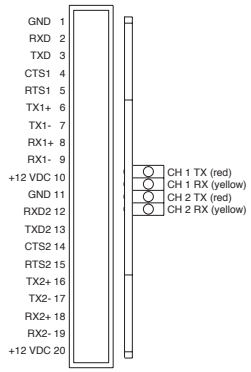
OPERATION
DATA 1-2
2 RS-232/422/485 control ports, supports XON/XOFF, CTS/RTS, 300–115,200 baud

STATUS
2 LEDs for each channel Red LED for data TX, RTS Yellow LED for data RX, CTS Green ICSP status LED

WIRING
3.5mm captive-screw terminals

MODELS
NXC-COM2 Dual COM Port Card
NXM-COM2 Dual COM Port NetModule

HOUSING
- NXF NetLinx CardFrame
- NXS-NMS NetModule Shell



ANALOG VOLTAGE, 4 ANALOG I/O CHANNELS

- Provides 4 analog Input/Output channels and front-panel LED feedback
- Drives internal voltage or accepts external Input/Output DC voltages

OPERATION
INPUTS 1-4
0 to +12 VDC, ref. to power supply GND

OUTPUTS
1-4: -12 to +12 VDC, 60ma ref. to power supply GND

FEEDBACK
4 Red LEDs for channel Out, 4 Yellow LEDs for channel In Green ICSP status LED

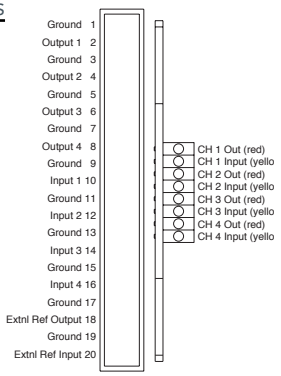
JUMPERS
Select output type: Single- ended bipolar and external reference

RESOLUTION
10-bit A/D, 1024 steps

WIRING
3.5mm captive-screw terminals

MODELS
NXC-VAI4 Analog I/O 4 Card

HOUSING
- NXF NetLinx CardFrame
- NXS-NMS NetModule Shell



4-PORT IR/S, 4 IR PORTS AND 4 I/0 PORTS

- Provides 4 IR/Serial control ports and front-panel status feedback
- Includes 4 inputs for sensed IR power control

OPERATION
IR 1-4
4 IR/IR Serial control ports 20 KHz-1.14 MHz

INPUT 1-4
4 I/O ports for closure or 0–5 VDC sensing, 200 mA

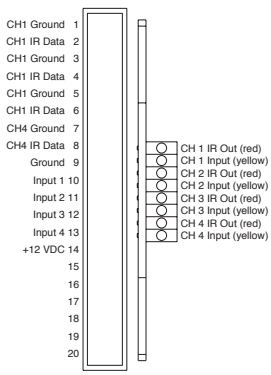
POWER
+12 VDC power for sensors

STATUS 1-10
2 LEDs for each channel, Red LED for IR transmission, Yellow LED for input status, Green ICSP status LED

WIRING
3.5mm captive-screw terminals

MODELS
NXC-IRS4 4-Port IR/S Card

HOUSING
- NXF NetLinx CardFrame
- NXS-NMS NetModule Shell



RELAY 10, 10 RELAYS

- Provides 10 isolated relays and front-panel LED feedback

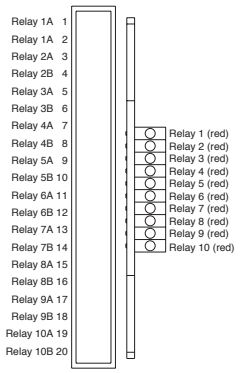
OPERATION
RELAY 1-10
10 relays, 750 mA, 28 VAC/24 VDC normally open

STATUS 1-10
1 LED for each relay, Red LED shows on status, Green ICSP status LED

WIRING
3.5mm captive-screw terminals

MODELS
NXC-REL10 Relay 10 Card

HOUSING
- NXF NetLinx CardFrame
- NXS-NMS NetModule Shell



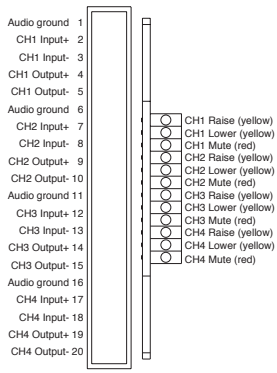
VOLUME, 4 AUDIO CHANNELS

- Provides 4 channels of audio attenuation
- 100 db of volume coontrol

OPERATION
- Inputs: 1-4, balanced or unbalanced audio
- Outputs: 1-4, balanced audio
- Status: 3 LEDs for each channel
  - Yellow LED for raise volume
  - Yellow LED for lower volume
  - Red LED for muting volume
- Wiring: 3.5 mm captive-screw terminals

MODELS
- NXC-VOL4 Volume Card

HOUSING
- NXF NetLinx CardFrame
- NXS-NMS NetModule Shell



INPUT 10, 10 INPUT/OUTPUT CHANNELS

- Provides 10 Input/Output control channels and front-panel feedback
- Acts as logic-level switch or input, senses high and low voltage states in voltage mode

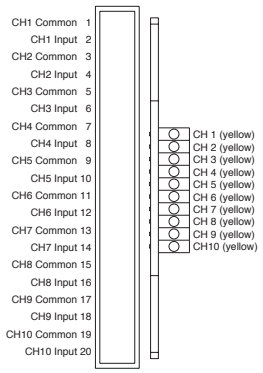
OPERATION
I/O
10 I/O channels

STATUS
1 LED for each channel, Yellow LED for on status, Green ICSP status LED

WIRING
3.5mm captive-screw terminals

MODELS
NXC-I/O10 Input 10 Card

HOUSING
- NXF NetLinx CardFrame
- NXS-NMS NetModule Shell



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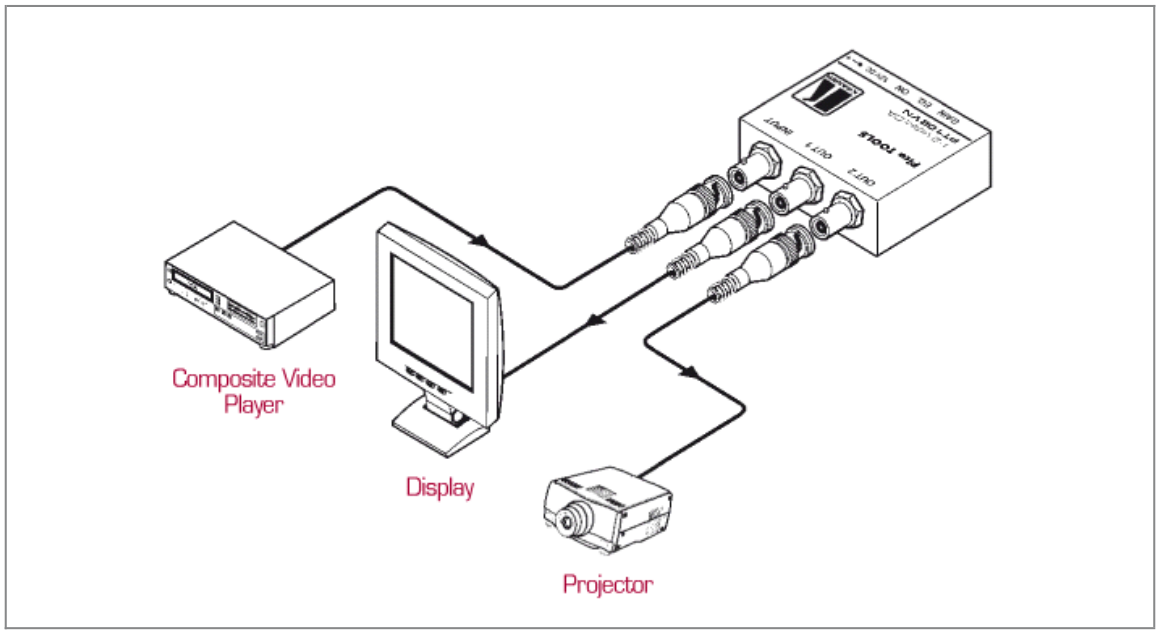
KRAMER ELECTRONICS, Ltd.
www.kramerelectronics.com

PT-102VN

1:2 Composite Video Distribution Amplifier

The PT-102VN is a distribution amplifier for composite video or SDI signals. It takes one input, provides correct buffering and isolation and distributes the signal to two identical outputs.



KRAMER ELECTRONICS, Ltd.
www.kramerelectronics.com

PT-102VN

FEATURES

- High Bandwidth - 430MHz (-3dB).
- Level (Gain) and EQ (Peaking) Controls.
- Ultra Compact Pico TOOLS™ - 4 units can be rack mounted side-by-side in a 1U rack space with the optional RK-4PT rack adapter.

TECHNICAL SPECIFICATIONS

INPUTS:	1 video, 1Vpp/75Ω on a BNC connector.
OUTPUTS:	2 video, 1Vpp/75Ω on BNC connectors.
MAX. VIDEO OUTPUT:	2Vpp.
VIDEO BANDWIDTH (-3dB):	430MHz.
DIFF. GAIN:	0.05%.
DIFF. PHASE:	0.05Deg.
K-FACTOR:	<0.05%.
S/N RATIO:	76.1dB.
CONTROL:	Gain: -1.2 to +6dB, EQ.: 0 to +7.5dB @50MHz via trimmers accessible from the front panel.
POWER SOURCE:	12V DC, 30mA.
DIMENSIONS:	6cm x 6.5cm x 2.5cm (2.36" x 2.56" x 1") W, D, H.
WEIGHT:	0.14kg (0.31lbs) approx.
ACCESSORIES:	Power supply.
OPTIONS:	RK-4PT 19" rack adapter.

Video Binloop™

Professional 16 Track Video Player

For more than a decade our Digital Binloop has been the industry standard for theme park audio reproduction. Now you can enjoy those same benefits with our Video Binloop, a compact, economical, and highly reliable 16 track video player.

The Video Binloop cage accommodates up to 16 reproducer cards. Clips are stored on CompactFlash media, so there are absolutely no moving parts to wear out. Each card can hold hours of video. Simply copy files — thousands of them, if you like — from your PC to the CompactFlash card.

The Video Binloop locks to NTSC or PAL video sync, and reads or generates linear timecode at many different SMPTE and EBU rates.

Control the Video Binloop using contact closures, RS-232, MIDI, and Ethernet (4Q2006) — all simultaneously! Reproducer cards or whole Binloops can be grouped to respond to the same command, allowing a single event to control hundreds of tracks.

Encode your video in MPEG-2 at up to 15Mbps — about twice the bitrate of most DVDs. Composite, YUV and component video outputs are standard, and SDI (SMPTE-259M) digital video is also available. When playing video, each of the sixteen tracks may be multiplexed with stereo or Dolby AC3 audio— that's almost 100 channels of audio!

The Video Binloop is the most advanced multitrack video player in the world, yet it's highly economical. Contact your Alcorn McBride representative today for a demonstration.

The Video Binloop's feature set is nearly identical to that of the Digital Binloop, except for audio playback, as shown below:

	Digital Binloop	Video Binloop
Maximum Audio Resolution	24 bits	16 bits
Maximum Audio Bitrate	96 KHz	48 KHz
Cobranet	option	no

Applications

- *Museums*
- *Cruise Ships*
- *Theme Parks*
- *Visitor Centers*
- *Retail Stores*
- *Restaurants*
- *Casinos*

Features

- *16 Video Tracks*
- *16x Stereo or AC3*
- *1000s of Clips*
- *Instant Playback*
- *No Moving Parts*
- *Timecode Sync*
- *Video Sync*
- *MIDI, RS-232*
- *Contact Control*
- *Ethernet*
- *Zero Maintenance*

Alcorn McBride Inc.

3300 S. Hiawassee Rd.
Building 105
Orlando, FL 32835
Tel (407) 296-5800
Fax (407) 296-5801
info@alcorn.com

Video Binloop™

Professional 16 Track Video Player

Specifications

Cage Assembly

Model Number	DBCV32
Dimensions	19"W x 5.25"H x 10.25"D (48cm x 13cm x 26cm)
Weight	25lbs (11Kg)
Power	110 or 220 VAC, 50 or 60 Hz, 300W Max.
Certifications	UL Listed, CE Compliant, ROHS, WEEE
Operating Temperature	0°C (32°F) to 38°C (100°F) free air circulation.
Operating Environment	0-90% relative humidity, non-condensing

Controller

Model Number	DBAP2 (DBAP3 available 4Q06)
Linear Timecode Formats	SMPTE or EBU
LTC Rates	23.98, 24, 25, 29.97, 30, and 30 drop
LTC Dropout Tolerance	Infinite
LTC Input	Transformer Isolated, 600 ohm Balanced
LTC Output Level	Selectable 1-10 Vp-p, Balanced or Unbalanced, 10 ohms max
Front Panel Buttons	Start, Pause, Stop SMPTE, Mute
Front Panel Display	2 line VFD
Status Outputs	Ready, Running, and Fault Contact Closures
Serial Control	RS-232C
Control Inputs	LTC Control plus 8 Group Starts
Ethernet Control	100 Base-T (DBAP3)
Video Sync Input	NTSC or PAL Composite Sync

Video Reproducer (up to 16)

Model Number	REPRO16V
Media	CompactFlash, FAT 32 File System
Front Panel Button	Play/Stop
Indicators	Playing, Still/Pause, Muted
Video File Format	MPEG-2, MP@ML Program Stream
Video Bitrate	15 Mbps Max
Analog Video Output	Composite, Component (YUV or RGsB)
Scan Rate	NTSC or PAL (480p or 576p)
Digital Video Output	SDI (SMPTE-259M) (optional)
Audio Encoding for Video	16 bit MPEG Layer 2 or Dolby AC-3 5.1
Audio-Only File Formats	16 bit WAV, AIFF, PCM, 32, 44.1 or 48 KHz, Stereo or Mono
Track Skew	Less than 100ns
Analog Audio Output Level Balanced	+8 volts max. into 150 ohms
Analog Audio Output Level Unbalanced	+4 volts max. into 20K
Output Impedance	DC Coupled, less than 10 ohms
Frequency Response	DC-20,000 Hz +/- 0.5 dB
Signal-to-Noise Ratio	120 dB
THD	0.008%
Digital Audio Output	AES/EBU, S/PDIF (IEC958) or AC3

Specifications subject to change without notice.

Ethernet available 4Q2006.

Alcorn McBride Inc.
3300 S. Hiawassee Rd.
Building 105
Orlando, FL 32835
Tel (407) 296-5800
Fax (407) 296-5801
info@alcorn.com

The Intelix AVO-V1 transmits one composite video signal over structured cabling, such as Cat 5. Used in pairs, AVO-V1 baluns replace bulky coaxial video cable and utilize a building's existing Cat 5/LAN cabling. AVO-V1 baluns are typically used in security and monitoring applications with such equipment as CCTV cameras, monitors, DVRs, video sequencers, video multiplexers, quads, switchers, servers, and VCRs.

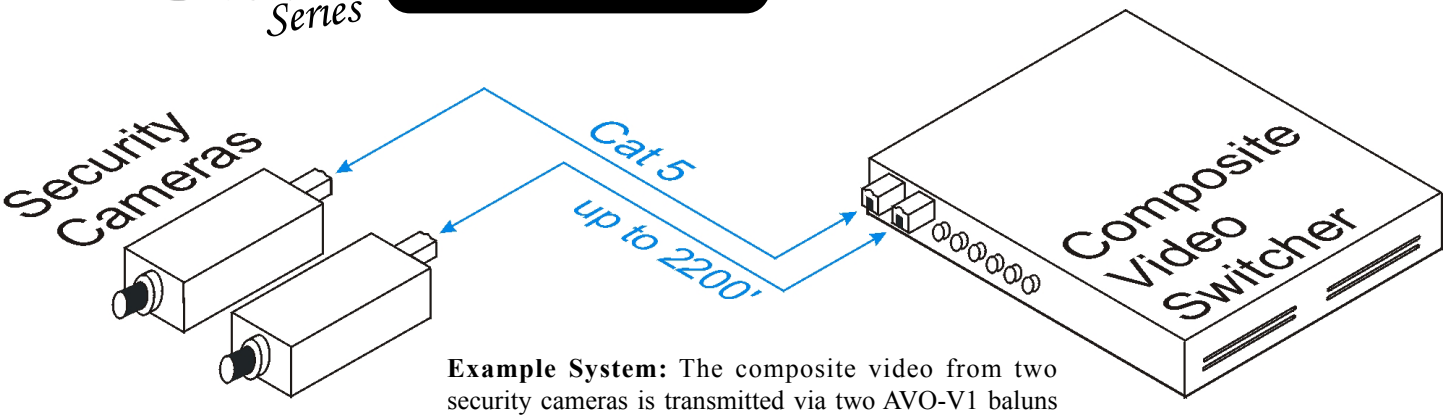
The Intelix **AvoCat** Series of baluns is the ideal solution for sending video over structured cabling. **When signal quality matters, choose Intelix.**

Technical Specifications

Maximum Distance*	2200 feet
Maximum Input	1.1 Vp-p
Bandwidth	DC to 8 MHz
Impedance	75 ohms
Insertion Loss	Less than 2 dB over the frequency range
Return Loss	Greater than 15 dB over the frequency range
Common Mode Rejection	Greater than 40 dB over the frequency range
Unshielded Twisted Pair Cabling Specifications (24 gauge or lower solid copper)	Maximum capacitance: 20 pf/foot Impedance: 100 ohms @ 1 MHz Attenuation: 6.6 dB/1000 ft. @ 1 MHz *Cat 5, Cat 5e, Cat 6, Cat 7 compatible*
Connectors	One (1) male BNC to one (1) RJ45
RJ45 Pinout	Red: 7 & 8, pair 4
Temperature	Operating: 32 to 131 F (0 to 55 C) Storage: -4 to 185 F (-20 to 85 C) Humidity: up to 95%
Enclosure	Black plastic
Dimensions	1.6" x 2.8" x 1.0"
Ordering Information	*AVO-V1*: single AVO-V1 in bulk packaging *AVO-V1-PAC*: two AVO-V1 baluns in retail-ready packaging
Warranty	Two years

*Distances and picture quality may be affected by cable grade, cable quality, source and destination equipment, RF and electrical interference, and cable patches. Intelix specifications are based on straight-through cabling with standard-grade Cat 5.

AvoCat Series AVoverCat5.com



Example System: The composite video from two security cameras is transmitted via two AVO-V1 baluns and Cat 5 cabling to a remote video switcher. The AVO-V1 baluns are connected directly to the send and receive device's BNC connectors.

intelix DESIGN WITH INTELLIGENCE
2222 Pleasant View Road
Suite #1
Middleton, WI 53562
Phone: 608-831-0880
Toll-Free: 1-866-4-MATMIX
Fax: 608-831-1833

Detailed Specifications & Technical Data

ENGLISH MEASUREMENT VERSION

8205 Multi-Conductor - High-Conductivity Copper Speaker Cable Twisted Jacketed Con

For more Information
please call

1-800-Belden1

Description:

20 AWG stranded (7x28) tinned copper conductors, PVC insulation, twisted pairs, PVC jacket.

Physical Characteristics (Overall)

Conductor

AWG:

# Pairs	AWG	Stranding	Conductor Material
1	20	7x28	TC - Tinned Copper

Insulation

Insulation Material:

Insulation Material	Wall Thickness (in.)
PVC - Polyvinyl Chloride	.013

Outer Shield

Outer Shield Material:

Outer Shield Material
Unshielded

Outer Jacket

Outer Jacket Material:

Outer Jacket Material	Nom. Wall Thickness (in.)
PVC - Polyvinyl Chloride	.025

Overall Cabling

Overall Nominal Diameter:	0.180 in.

Pair

Pair Color Code Chart:

Number	Color
1	Black & Red

Mechanical Characteristics (Overall)

Operating Temperature Range:	-20°C To +80°C
Bulk Cable Weight:	15.300 lbs/1000 ft.
Max. Recommended Pulling Tension:	28 lbs.
Min. Bend Radius (Install)/Minor Axis:	2 in.

Applicable Specifications and Agency Compliance (Overall)

Applicable Standards & Environmental Programs

NEC/(UL) Specification:	CMG
CEC/C(UL) Specification:	CMG
EU CE Mark:	Yes
EU Directive 2000/53/EC (ELV):	Yes
EU Directive 2002/95/EC (RoHS):	Yes
EU RoHS Compliance Date (mm/dd/yyyy):	04/01/2005

8205 Multi-Conductor - High-Conductivity Copper Speaker Cable Twisted Jacketed Con

EU Directive 2002/96/EC (WEEE):	Yes
EU Directive 2003/11/EC (BFR):	Yes
CA Prop 65 (CJ for Wire & Cable):	Yes
MII Order #39 (China RoHS):	Yes

Flame Test

C(UL) Flame Test:	FT4

Plenum/Non-Plenum

Plenum (Y/N):	No

Electrical Characteristics (Overall)

Nom. Capacitance Conductor to Conductor:

Capacitance (pF/ft)
24.5

Nom. Conductor DC Resistance:

DCR @ 20°C (Ohm/1000 ft)
10.0

Max. Operating Voltage - UL:

Voltage
300 V RMS

Max. Recommended Current:

Current
3.7 Amps per conductor @ 20°C

Related Documents:

No related documents are available for this product

Put Ups and Colors:

Item #	Putup	Ship Weight	Color	Notes	Item Desc
8205 060U1000	1,000 FT	18.000 LB	CHROME		1 PR #20 PVC FRPVC
8205 060U500	500 FT	9.000 LB	CHROME		1 PR #20 PVC FRPVC
8205 060100	100 FT	2.300 LB	CHROME		1 PR #20 PVC FRPVC
8205 0601000	1,000 FT	18.000 LB	CHROME	C	1 PR #20 PVC FRPVC
8205 060500	500 FT	9.000 LB	CHROME		1 PR #20 PVC FRPVC
8205 0605000	5,000 FT	85.000 LB	CHROME		1 PR #20 PVC FRPVC

Notes:
C = CRATE REEL PUT-UP.

Revision Number: 1 Revision Date: 09-18-2008

Detailed Specifications & Technical Data

ENGLISH MEASUREMENT VERSION

9750 Multi-Conductor - Audio, Control and Instrumentation Cable

For more Information
please call

1-800-Belden1

Description:

20 AWG stranded (7x28) tinned copper conductors, PVC insulation, twisted pairs, PVC jacket.

Physical Characteristics (Overall)

Conductor

AWG:

# Pairs	AWG	Stranding	Conductor Material
3	20	7x28	TC - Tinned Copper

Insulation

Insulation Material:

Insulation Material	Wall Thickness (in.)
PVC - Polyvinyl Chloride	.013

Outer Shield

Outer Shield Material:

Outer Shield Material
Unshielded

Outer Jacket

Outer Jacket Material:

Outer Jacket Material	Nom. Wall Thickness (in.)
PVC - Polyvinyl Chloride	.035

Overall Cabling

Overall Nominal Diameter:	0.299 in.

Pair

Pair Color Code Chart:

Number	Color
1	Black & Red
2	Black & White
3	Black & Green

Mechanical Characteristics (Overall)

Operating Temperature Range:	-20°C To +80°C
Non-UL Temperature Rating:	80°C (UL AWM Style 2464)
Bulk Cable Weight:	45.200 lbs/1000 ft.
Max. Recommended Pulling Tension:	84 lbs.
Min. Bend Radius (Install)/Minor Axis:	3 in.

Applicable Specifications and Agency Compliance (Overall)

Applicable Standards & Environmental Programs

NEC/(UL) Specification:	CMG
CEC/C(UL) Specification:	CMG
AWM Specification:	UL Style 2464 (300 V 80°C)
EU CE Mark:	Yes

EU Directive 2000/53/EC (ELV):	Yes
EU Directive 2002/95/EC (RoHS):	Yes
EU RoHS Compliance Date (mm/dd/yyyy):	04/01/2005
EU Directive 2002/96/EC (WEEE):	Yes
EU Directive 2003/11/EC (BFR):	Yes
CA Prop 65 (CJ for Wire & Cable):	Yes
MII Order #39 (China RoHS):	Yes

Flame Test

C(UL) Flame Test:	FT4

Plenum/Non-Plenum

Plenum (Y/N):	No

Electrical Characteristics (Overall)

Nom. Capacitance Conductor to Conductor:

Capacitance (pF/ft)
24.5

Nom. Conductor DC Resistance:

DCR @ 20°C (Ohm/1000 ft)
10.0

Max. Operating Voltage - UL:

Voltage
300 V RMS (UL AWM Style 2464)

Max. Recommended Current:

Current
2.6 Amps per conductor @ 20°C

Related Documents:

No related documents are available for this product

Put Ups and Colors:

Item #	Putup	Ship Weight	Color	Notes	Item Desc
9750 0601000	1,000 FT	50.000 LB	CHROME	C	3 #20 PR PVC PVC
9750 060500	500 FT	26.500 LB	CHROME	C	3 #20 PR PVC PVC

Notes:
C = CRATE REEL PUT-UP.

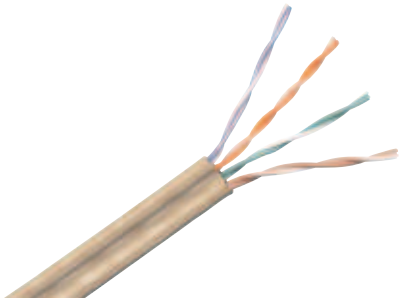
Revision Number: 1 Revision Date: 09-18-2008

9750 Multi-Conductor - Audio, Control and Instrumentation Cable

BELDEN
SENDING ALL THE RIGHT SIGNALS

DATASheet

MediaTwist Cable Series, Enhanced Category 6



1872A X6G1000 MediaTwist

MediaTwist® is engineered to exceed the ANSI/TIA/EIA-568-B.2-1 Category 6 requirements. The exceptional physical uniformity of MediaTwist translates into premier electrical performance benefits for users. Available in plenum and non-plenum versions, MediaTwist has taken Bonded-Pair technology a step further. Its unique crescent shape design ensures that pair-to-pair movement is minimized during installation. The innovative design of MediaTwist provides stable crosstalk and impedance performance both before and after installation. This results in improved signal integrity and reduced signal radiation, making MediaTwist an excellent choice for your Category 6 cable.

Features & Benefits

- Jacket sequentially marked at two feet intervals
- Utilizes patented Bonded-Pair Technology:

  Maintains signal integrity

  Mitigates impedance mismatch

  Immunity to outside electrical noise.
- Lifetime warranty to the original end user
- Enhanced performance, beyond Category 6
- Installable Performance®.

Applications

- MediaTwist® cables are intended to be used in horizontal cable installations of high speed Local Area Networks (LANs).
- UTP Ethernet (1000Base-T, 100Base-TX, 100Base-T4, 100Base-T2 and 10 Base-T)
- UTP based ATM systems
- 100 Mb/s TP-PMD
- RS-422
- UTP Networks in high EMI and RFI noise environments
- AES/EBU Digital Video, NTSC/PAL Component Video.

Technical Specifications

- Conductors: 23 AWG solid bare copper
- Insulation:

  Plenum: 100% Dupont Teflon® FEP

  Non-Plenum: Polyolefin

  Color coding as per ANSI/TIA/EIA-568-B.2-1.
- Cable Core: Four twisted pairs, Rip Cord
- Jacket:

  Plenum: Flamarrest®

  Non-Plenum: PVC.

Transmission Characteristics

- Values above 350 MHz are for information purposes only
- DC Resistance @ 20°C, max.: 9 ohms/100 m
- DC Resistance Unbalance @ 20°C, maximum: 3%
- Mutual Capacitance @ 1 KHz, nominal: 15.0 pF/ft
- Capacitance Unbalance Pair to Ground, max.: 49.2 pF/100 m
- Input Impedance: 100 ± 12 ohms from 1 to 20 MHz, 100 ± 15 ohms from 25 to 200 MHz, 100 ± 20 ohms from 250 to 310 MHz, 100 ± 22 ohms from 310 to 500 MHz
- Nominal Velocity of Propagation (NVP):

  Plenum: 72%

  Non-Plenum: 70%.
- Propagation Delay (Skew), max.: 25 ns/100 m.

MediaTwist Cable Series, Enhanced Category 6

FREQUENCY (MHz)	ATTENUATION (dB/100 m) (max.)	NEXT (dB) (min.)	PSNEXT (dB) (min.)	ACR (dB) (min.)	PSACR (dB) (min.)	ELFEXT (dB) (min.)	PSELFEXT (dB) (min.)	RETURN LOSS (DB) (min.)
1.0	1.9	74.3	72.3	70.0	70.0	67.8	64.8	20.0
4.0	3.7	65.3	63.3	59.0	59.0	55.7	52.8	23.0
8.0	5.3	60.8	58.8	53.0	53.0	49.7	46.7	24.5
10.0	5.9	59.9	57.3	51.0	51.0	47.8	44.8	25.0
16.0	7.5	56.3	54.3	46.0	46.0	43.7	40.7	25.0
20.0	8.4	54.8	52.8	44.0	44.0	41.8	38.8	25.0
25.0	9.5	53.4	51.4	42.0	42.0	39.8	36.8	24.3
31.25	10.6	51.9	49.9	39.0	39.0	37.9	34.9	23.6
62.5	15.4	47.4	45.4	30.0	30.0	31.9	28.9	21.5
100.0	19.8	44.3	42.3	25.0	25.0	27.8	24.8	21.0
155.0	25.1	41.5	39.5	14.0	14.0	23.9	20.9	21.0
200.0	29.0	39.8	37.8	10.0	10.0	21.8	18.8	21.0
250.0	32.8	38.3	36.3	3.0	3.0	19.8	16.8	18.0
300.0	35.2	37.2	35.2	0	0	18.2	15.2	18.0
310.0	37.1	36.9	34.9	–	–	17.9	14.9	18.0
350.0	39.8	36.2	34.2	–	–	16.9	13.9	17.0
400.0	43.0	35.3	33.3	–	–	15.7	12.7	14.0
500.0	49.0	33.8	31.8	–	–	13.8	10.8	14.0

Mechanical Characteristics

- Operating Temperature range: -20°C to 80°C
- Nominal O.D.: 9.271 x 4.169 mm (0.365 x 0.165 in.)
- Min. Bend Radius: 2.54 mm (0.1 in.)
- Weight (Cable only):

  CMR: 13.154 kg/km (29.0 lb/kft)

  CMP: 14.061 kg/km (31.0 lb/kft).

MediaTwist Cable Series, Enhanced Category 6

Qualifications

- Meets or exceeds Category 6 requirements per ANSI/TIA/EIA-568-B
- Meets or exceeds the Category 6 requirements per IEC 11801
- Meets or exceeds the Category 6 requirements per NEMA Standard WC 66
- Riser: Listed as NEC Type CMR per UL Standard 444, Meets UL 1666 and CSA FT4 Flame Tests
- Plenum: Listed as NEC Type CMP per UL Standard 444, Meets UL 910 and CSA FT6 Flame Tests.

For More Information

For any other product information call: 1-800-BELDEN-1 or visit us at www.Belden.com

All information is subject to change without notice, since Belden CDT reserves the right to change its products as progress in engineering and manufacturing methods or other circumstances may warrant.

Ordering Information

MediaTwist, 4-pair, 23 AWG

COLOR	LENGTH	PACKAGING	NO. OF PACK PER PALLET	TOTAL PER PALLET	ORDERING NUMBER
MediaTwist, CMR					
White,	305 m (1000 ft.),	Reel			1872A 0091000
Light Blue,	305 m (1000 ft.),	Reel			1872A 0061000
White,	305 m (1000 ft.),	Reel-in-a-Box			1872A 009A1000
Light Blue,	305 m (1000 ft.),	Reel-in-a-Box			1872A 006A1000
MediaTwist, CMP					
White,	305 m (1000 ft.),	Reel			1874A 0091000
Blue,	305 m (1000 ft.),	Reel			1874A D151000
White,	305 m (1000 ft.),	Reel-in-a-Box			1874A 009A1000
Blue,	305 m (1000 ft.),	Reel-in-a-Box			1874A D15A1000

Alternative colors, lengths and packaging are available, please contact Customer Service for more details.

Quality Features

- Attractive wood-finish assemblies are ideal for surface mounting speaker applications.
- Assemblies include a hanger bracket and color coded speaker leads for fast wall mount installation.
- Choose models with or without knob-adjust volume control.

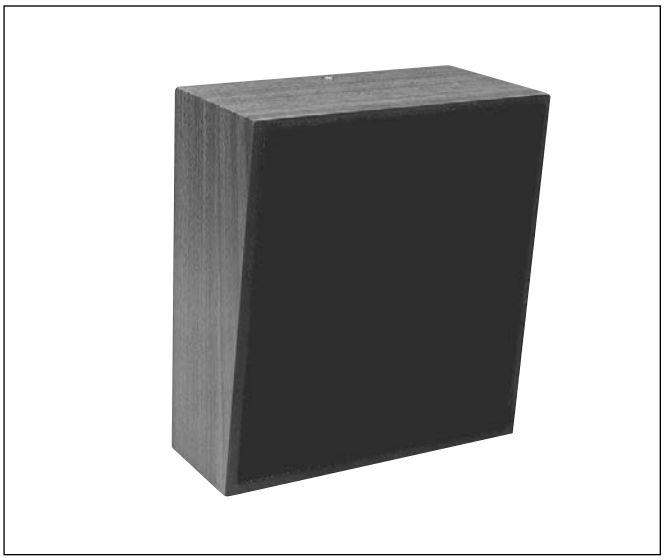
Description

Slope-front Wall Speaker Series SL810 is an attractive speaker assembly for surface-mount applications where the aesthetics of a wood finish housing with black cloth grille are preferred characteristics for the paging and music speakers.

Each assembly includes dual cone 8" 10 oz. driver Model 810 with a factory wired dual voltage transformer mounted within a slope-front housing. The housing measures 10.551"H x 9.469"W with a front-to-rear depth of 5.5" at the top and 3.625" at the bottom. The housing is particle board construction with an attractive walnut laminate and black fabric grille. The assembly includes a rear mounted hanger bracket with easy-install keyhole mount located on the center top edge of the housing. The housing has an open back and features a .354"Dia. opening with a black gasket, bottom center, for optional factory wired volume control. For wired volume control with knob adjustment, select Model SL810-T72K.

A & E Specifications

Slope-front speaker assembly shall be Lowell Model _____ (SL810-T72 or SL810-T72K with knob-style volume control). Assembly shall include a 15W dual cone driver with dual voltage transformer mounted within a slope-front housing constructed of particle board and covered with a walnut laminate and black cloth grille. Speaker shall have a frequency response of 47Hz - 20kHz ±6dB and an average sensitivity of 95dB. Factory-wired transformer shall be dual voltage (70V / 25V) with power taps at 0.25, 0.5, 1, 2, and 5 watts. Assembly shall terminate with color coded leads.



SL810-72 (15W)
Assemblies include a slope-front wood enclosure with a factory mounted driver, transformer, and optional volume control.

Assembly driver Model 810 (15W) includes a wired dual voltage transformer.

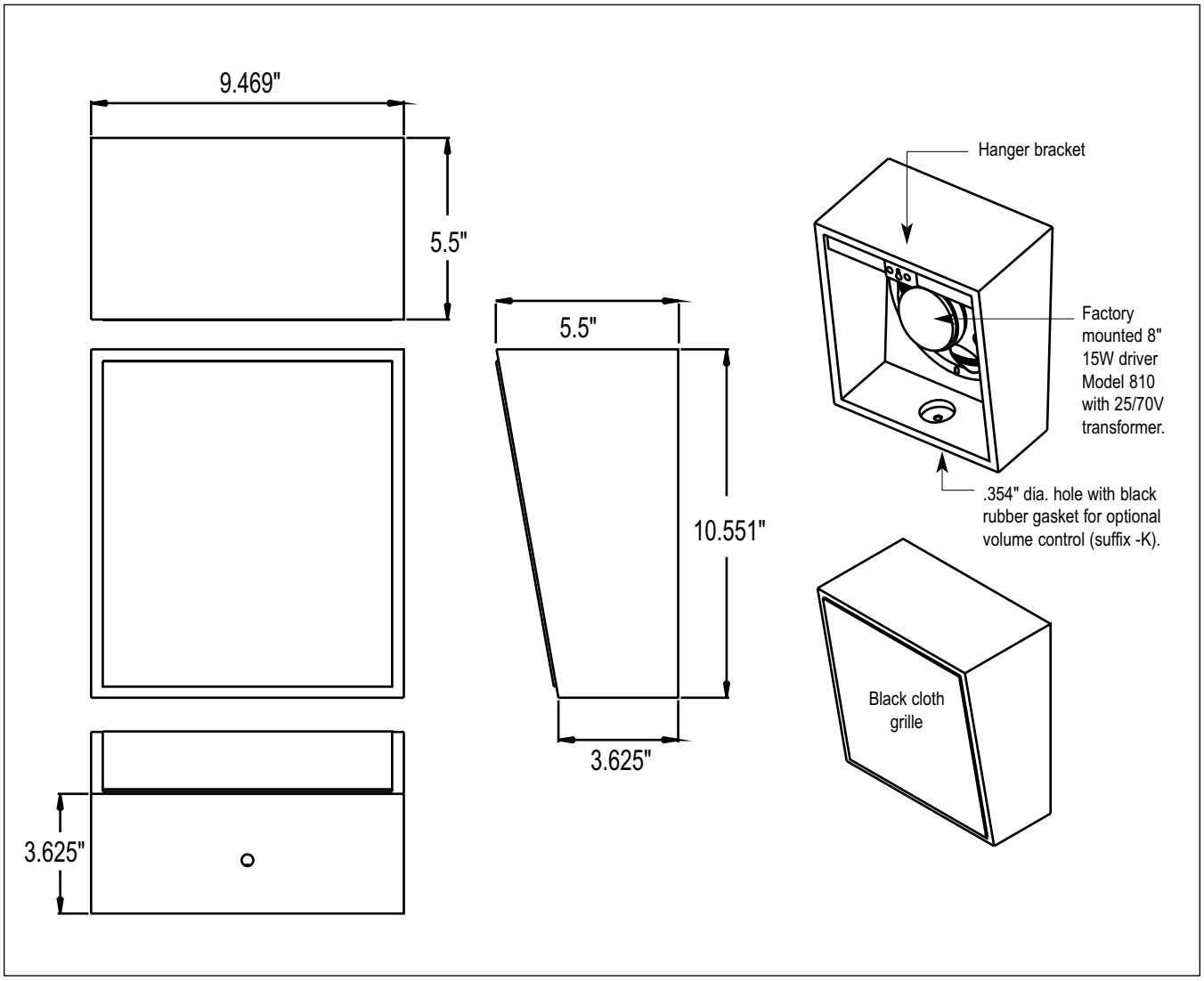
ASSEMBLY MODELS

Assembly Model	Driver Model	Transformer 70V / 25V	Transformer (wired)	Grille	Sloped Backbox (Particle board with walnut laminate)	Mounting Style	Volume Control
SL810-T72	810	70 / 25	0.25, 0.5, 1, 2,5W	Black cloth	10.551"H x 9.469"W x 5.5"D (top), 3.625"D (bottom)	Rear hanger bracket	No
SL810-T72K	810	70 / 25	0.25, 0.5, 1, 2,5W	Black cloth	10.551"H x 9.469"W x 5.5"D (top), 3.625"D (bottom)	Rear hanger bracket	Yes (knob)

DRIVER SPECIFICATIONS

Driver Model	Size	Power Rating	Type	Ceramic Magnet	Frequency Response	Dispersion	Voice Coil Impedance	Voice Coil Diameter	Sensitivity 1W / 1M	Depth	Weight
810	8"	15W RMS	Dual cone	10 oz.	47Hz - 20kHz ±6dB	120° @ 2000Hz -6dB	8 Ohms	1"	95dB Avg. 100dB Peak	2.84"	2.0 lbs.

Lowell Manufacturing Company • 100 Integram Drive • Pacific, Missouri 63069 U.S.A.
Call 800.325.9660, 636.257.3400 • **Fax** 636.257.6606 • **Click** www.lowellmfg.com

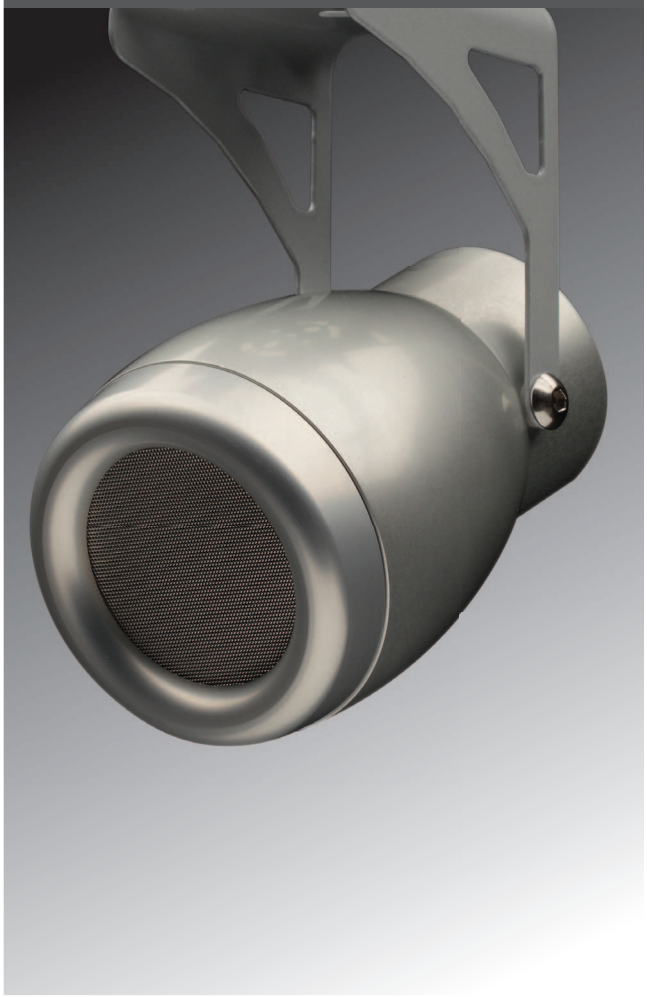


Dimensions for Lowell Model Series SL810

KT20 - KT22

2” point source compact speaker

DATASHEET



Features:

- Unique performance-to-size ratio
- Single 2” long excursion full range driver
- Wide-range frequency response
- High speech intelligibility and high dynamic
- range for music applications
- Integrated Speakon connector (option) for mobile or installed application
- Full Aluminum ultra strong frame
- Available in Black or Aluminum
- Integrated connection points for accessories
- Only 350g of weight

Applications:

- High-quality distributed systems for paging and music
- Exhibit audio for museum displays
- Space-sensitive fill for theatres

K-array Tornado KT20 miniature sound source is a passive loudspeaker designed for high-quality distributed systems. Housed in a compact aluminum enclosure, the KT20 is especially suitable for installations involving space limitations and visibility concerns.
The KT20 has flexible and easy-to-configure mounting options.
With its ability to effortlessly reproduce both speech and music, it makes an excellent choice for fixed applications such as theatre, museum displays, restaurants, portable systems for corporate AV presentations, department stores, and in hidden locations

such as chancel steps in houses of worship; the applications are endless.
The KT20 has a proprietary 2” high efficiency drive unit with a neodymium magnet structure and a suspension engineered for maximum linear excursion and minimum residual transducer interference. The cone transducer delivers an impressive maximum peak SPL of 107dB, and has a wide operating frequency range from 150 Hz to 18 kHz with very low distortion.
All the components are designed in-house at our Florence based R&D department. They are custom manufactured to our exacting standards and quality control.

www.k-array.com

HP Sound Equipment s.r.l. Viale Roma 7/i - 50037 - San Piero a Sieve (FI), Italy
tel. +39 055 8487222 - fax. +39 055 8487238 - e-mail: info@k-array.com

KT20 - KT22	
Acoustics	
Speaker power handling	18 W(AES)
Max power	30 W [1]
Impedance	8 Ω (KT20) - 32 Ω (KT22)
Frequency range	150 HZ - 18 KHz +/- 3dB
SPL 1W/1mt	87 dB [2]
Maximum SPL	101 dB continuous - 107 dB peak
Coverage	
Horizontal	90°
Vertical	90°
Crossover	
Type	External cross over required
Frequency	150Hz 24dB/oct minimum suggested
Transducers	
Full-range	2” Neodymium cone driver with 0.75” voice coil
Audio Input	
Connector	2-pin Phoenix connector
Selection Switch	
Channel	-
Vertical dispersion	-
Recommended Amplifiers	
for KT20/KT20C	KA1-1, KA3-3, KA7, KA7-7, KA10, KA10-10 for up to 2 units each channel, with dedicated preset
for KT22/KT22C	KA3-3, KA7, KA7-7, KA10, KA10-10 for up to 8 units each channel, with dedicated preset
Physical	
Dimensions	6.4 x 8.3 x 14.3 cm (2.5” x 3.27” x 5.63”)
Weight	0.43 Kg (0.95 lbs)

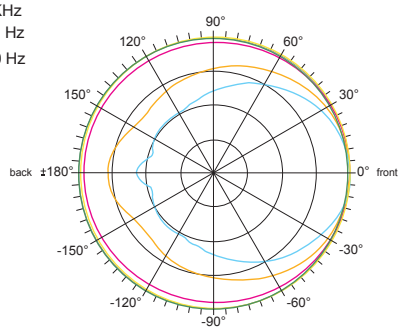
Notes for data

1. Maximum RMS applicable power for a musical signal, the reference signal is the one proposed by EIAJ standard.
2. Measured @4 mt then scaled @1 mt

New materials and design are introduced into existing products without previous notice. Present systems may differ in some respects from those presented in this brochure.

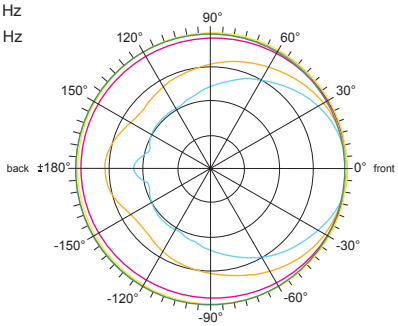
DISPERSION GRAPHS

8 KHz
4 KHz
1 KHz
500 Hz
250 Hz



horizontal

8 KHz
4 KHz
1 KHz
500 Hz
250 Hz



vertical

KZ10

Ultra miniaturized line-array element

DATASHEET

Features:

- Multiple 0.5” long excursion full range drivers
- Wide range frequency response
- Integrated connector
- Full aluminum ultra strong frame
- Available in Black or White
- High dynamic range capability
- Only 90g of weight

Applications:

- Background music systems in restaurants and clubs
- High quality distributed systems for paging and music
- Exhibit audio for museum displays
- Space-sensitive fill for broadcast
- Technical

The KZ10 is a remarkable ultra micro line array designed for discreet use in a variety of situations such as restaurants, bars, museums etc.
The rugged enclosure contains a line array of 4 x 0.5” long excursion, full range drivers housed in a sleek case built around a super strong chassis. The high efficiency drive units have neodymium magnet structures and suspensions engineered for maximum linear excursion and minimum residual transducer noise. This miniature slim column is a mere 1.7cm deep and delivers true crystal clear audio with an amazing output of 92dB continuous; remarkable from such a miniscule enclosure. The system delivers long throw and coherent coverage making it ideal for use in space constrained situations. Up to four KZ10’s can be integrated to the KKS50 sub bass, extending the frequency range to 35Hz. The KZ10 weighs a mere 90g and measures 2.2 x 10 x 1.7cm. All the components are designed in-house at our Florence based R&D department. They are custom manufactured to our exacting standards and quality control system in Italy.

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	KZ10
	Acoustics
Speakers power handling	8 W(AES)
Max power	15 W [1]
Impedance	16 Ω
Operating frequency range	350 Hz - 18 KHz +/- 3dB
SPL 1W/1mt	82 dB [2]
Maximum SPL	92 dB continuous - 98 dB peak
	Coverage
Horizontal	140°
Vertical	20°
	Cross over
Type	External crossover required
Frequency	250Hz 24dB/oct suggested minimum
	Transducers
Full-range	4 x 0.5" Neodymium speakers with 0.5" voice coil
	Powered Input
Connection	2 X silicon screw
	Recommended Amplifiers
	KA1-1, KA3-3, KA7, KA7-7 to drive till 4 KZ10 each channel with dedicated preset
	Physical
Dimensions	2.1 x 10 x 1.2 cm (0.83"x 3.94"x 0.47")
Weight	40 g (0.09 lb)

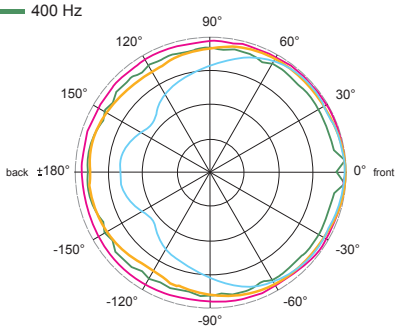
Notes for data

1. Maximum RMS applicable power for a musical signal, the reference signal is the one proposed by EIAJ standard.
2. Measured @4 mt then scaled @1 mt

New materials and design are introduced into existing products without previous notice. Present systems may differ in some respects from those presented in this brochure.

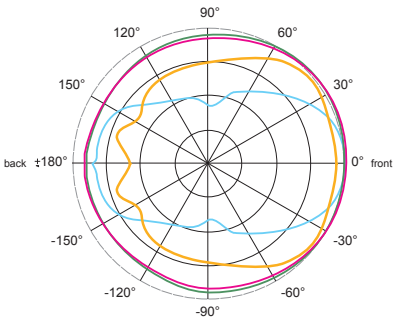
DISPERSION GRAPHS

8 KHz
4 KHz
1 KHz
400 Hz



horizontal

8 KHz
4 KHz
1 KHz
400 Hz



vertical

FEATURES

- Ultra-compact two-way system
- 5.25-in LF/1-in tweeter
- Magnetically shielded for use with video monitors
- High-output, high-definition sound from an ultra-compact enclosure

DESCRIPTION

Despite its compact size, the UB12Si will faithfully deliver high-output, high-definition sound for a wide variety of professional applications. All system elements, including drivers, crossover/filter components, and the enclosures themselves are designed to meet EAW's rigorous standards for reliablility and durability.

The system operates in fully passive mode with an internal passive crossover/filter network both dividing the signal and providing critical equalization functions.

Each UB12Si includes a robust 5.25-in woofer mounted in an optimally vented enclosure and a 1-in soft dome tweeter specifically designed to provide smooth, studio-quality high-frequency reproduction.

APPLICATION

As a stand alone system, the UB12Si delivers full range output at surprisingly high levels with flat response for a wide range of professional audio applications including multimedia production and presentation, corporate audio/visual systems, retail spaces, project recording studio, and home theaters. It is also a popular choice as a secondary distributed reinforcement system providing additional coverage in virtually any large scale installation such as theaters, performing arts centers, houses of worship and even arenas and stadiums.The ultra-compact enclosures can be unobtrusively mounted almost anywhere. The system includes 1/4-in threaded mounting points, two sets of which are configured to accept an Omnimount Series 20.5. They are also magnetically shielded for use in immediate proximity to video monitors making them an excellent choice for any multimedia application.

2-WAY FULL-RANGE ULTRA-COMPACT LOUDSPEAKER

See *NOTES TABULAR DATA* for details

PERFORMANCE

Frequency Response *(1 W @ 1m)*:

±3 dB	98 Hz to 20 kHz
-10 dB	60 Hz

Axial Sensitivity *(dB SPL, 1 W @ 1m):* 89

Impedence *(Ohms):* 8

Power Handling, AES Standard *(Watts):* 140*

Calculated Maximum Output *(dB SPL @ 1m):*

Peak	116.5*
Long Term	110.5*

Nominal Coverage Angles, -6 dp Points *(degrees):*

Conical	120

Recommended High-Pass Frequency:

24 dB/Octave	60 Hz

PHYSICAL

Configuration	2-way, full-range
Powering	Passive LF/HF crossover
LF Subsystem	5.25-in cone, vented
HF Subsystem	1-in soft dome tweeter
Coverage Angles	120° (conical)
Cabinet Type (shape)	Rectangular
Enclosure Materials	MDF
Finish	Black polyurethane
Connectors	2-contact terminal strip, Neutrik NL4 Speakon
Suspension Hardware	(6) 1/4" -20 threaded mounting points (1 each top and bottom, 2 on each side to accept Omnimount 20.5)
Grille	Powder-coated perforated steel , foam backed

Companion Systems:

Sub	SB48zP
Accessories	U-Bracket (606001)

Dimensions:

	Inches	*Millimeter*
Height	10.75	273
Width	6.38	162
Depth	6.00	152

Weights:

	Pounds	*Kilograms*
Net Weight (each)	9.2	4.2
Shipping Weight (each)	12	5.4

Applications

- *MultiMedia*
- *Boardrooms*
- *Theaters*
- *Ballroom Events*
- *Restaurants*
- *Small Retail*

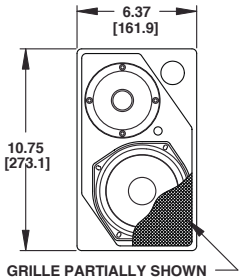
Eastern Acoustic Works One Main Street Whitinsville, MA 01588 tel 800 992 5013 / 508 234 6158 fax 508 234 8251 www.eaw.com

Part Number: 027773-90 June 2009

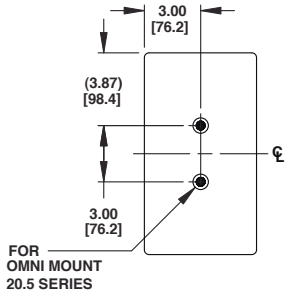
DIMENSIONAL DRAWING

UB12Si

NOTES:
1. SYMBOL ◉ INDICATES MOUNTING POINT, 1/4-20 THREADED HOLE.
2. SYMBOL ⊕ INDICATES CENTER OF BALANCE.
3. WEIGHT APPROX. 9.20 lb [4.2 kg].
4. SHIPPING WEIGHT APPROX. 12.00 lb [5.4 kg].

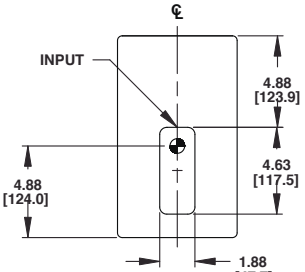


FRONT

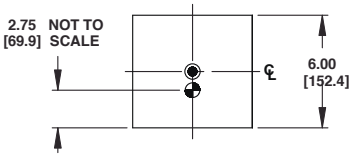


RIGHT SIDE

DIMENSIONS APPLY TO BOTH SIDES



BACK



TOP/BOTTOM

A & E SPECIFICATIONS

The two-way full-range loudspeaker system shall incorporate a 5.25-in LF transducers and a 1-in soft dome tweeter HF transducer.

The LF driver shall be mounted in a vented enclosure tuned for optimum low frequency response. The drivers shall be magnetically shielded for use in immediate proximity to video monitors. An internal passive filter network shall provide fourth order acoustical crossover and system equalization.

System frequency response shall vary no more than ±3 dB from 98 Hz to 20 kHz measured on axis. Operated with a high pass filter set a 90 Hz (24 dB /octave) the loudspeaker shall produce a Sound Pressure Level (SPL) of 89 dB SPL on axis at 1 meter with a power input of 1 Watt, and shall be capable of producing a peak output of 116.5 SPL on axis at 1 meter. The loudspeaker shall handle 140 Watts of amplifier power (AES Standard) and shall have a nominal impedance of 8 Ohms.

The loudspeaker enclosure shall be rectangular in shape. It shall be constructed of 3/4 thickness medium density fiberboard (MDF). It shall be finished in wear resistant textured black paint. Input connectors shall be 2-contact terminal strip and Neutrik NL4 Speakon. A total of six 1/4"-20 Threaded Mounting Points (1 each top and bottom, 2 on each side configured to accept an Omnimount Series 20.5) shall be provided. The front of the loudspeaker shall be covered with a powder coated perforated steel grille backed with open cell foam to protect against dust. The two-way full range loudspeaker shall be the EAW model UB12Si.

* Data indicate system performance in use with a 24 dB/oct. high-pass filter set at 90 Hz as is typical in most professional usage. Operation with the specified 60 Hz highpass frequency will yield 100 Watts power handling and a calculated peak output of 115.0 dB SPL @ 1m.

NOTES

TABULAR DATA

1. **Measurement/Data Processing Systems**: Primary - FChart: proprietary EAW software; Secondary - Brüel & Kjær 2012.
2. **Microphone Systems**: Earthworks M30; Brüel & Kjær 4133
3. **Measurements**: Dual channel FFT; length: 32 768 samples; sample rate: 48 kHz; logarithmic sine wave sweep.
4. **Measurement System Qualification** (includes all uncertainties): SPL: accuracy +/-0.2 dB @ 1 kHz, precision +/-0.5 dB 20 Hz to 20 kHz, resolution 0.05 dB; Frequency: accuracy +/-1 %, precision +/-0.1 Hz, resolution the larger of 1.5 Hz or 1/48 octave; Time: accuracy +/-10.4 µs, precision +/-0.5 µs, resolution 10.4 µs; Angular: accuracy +/-1°, precision +/-0.5°, resolution 0.5°.
5. **Environment**: Measurements time-windowed and processed to eliminate room effects, approximating an anechoic environment. Data processed as anechoic or fractional space, as noted.
6. **Measurement Distance**: 7.46 m. Acoustic responses represent complex summation of the subsystems at 20 m. SPL is referenced to other distances using the Inverse Square Law.
7. **Enclosure Orientation**: For beamwidth and polar specifications, as shown in Mechanical Specification drawing.
8. **Volts**: Measured rms value of the test signal.
9. **Watts**: Per audio industry practice, "loudspeaker watts" are calculated as voltage squared divided by rated nominal impedance. Thus, these are not True Watt units of energy as defined by International Standard.
10. **SPL**: (Sound Pressure Level) Equivalent to the average level of a signal referenced to 0 dB SPL = 20 microPascals.
11. **Subsystem**: This lists the transducer(s) and their acoustic loading for each passband. Sub = Subwoofer, LF = Low Frequency, MF = Mid Frequency, HF = High Frequency.
12. **Operating Mode**: User selectable configurations. Between system elements, a comma (,) = separate amplifier channels; a slash (/) = single amplifier channel. DSP = Digital Signal Processor. IMPORTANT: To achieve the specified performance, the listed external signal processing must be used with EAW-provided settings.
13. **Operating Range**: Range where the processed Frequency Response stays within -10 dB SPL of the power averaged SPL within this range; measured on the geometric axis. Narrow band dips are excepted.
14. **Nominal Beamwidth**: Design angle for the -6 dB SPL points, referenced to 0 dB SPL as the highest level.
15. **Axial Sensitivity**: Power averaged SPL over the Operating Range with an input voltage that would produce 1 W at the nominal impedance; measured with no external processing on the geometric axis, referenced to 1 m.
16. **Nominal Impedance**: Selected 4, 8, or 16 ohm resistance such that the minimum impedance point is no more than 20% below this resistance over the Operating Range.
17. **Accelerated Life Test**: Maximum test input voltage applied with an EIA-426B defined spectrum; measured with recommended signal processing and Recommended Protection Filter.
18. **Calculated Axial Output Limit**: Highest average and peak SPLs possible during the Accelerated Life Test. The Peak SPL represents the 2:1 (6 dB) crest factor of the Life Test signal.
19. **High Pass Filter**: This helps protect the loudspeaker from excessive input signal levels at frequencies below the Operating Range.

GRAPHIC DATA

1. **Resolution**: To remove insignificant fine details, 1/12 octave cepstral smoothing was applied to acoustic frequency responses and 1/3 octave cepstral smoothing was applied to the beamwidth and impedance data. Other graphs are plotted using raw data.
2. **Frequency Responses**: Variation in acoustic output level with frequency for a constant input signal. Processed: normalized to 0 dB SPL. Unprocessed inputs: 2 V (4 ohm nominal impedance), 2.83 V (8 ohm nominal impedance), or 4 V (16 ohm nominal impedance) referenced to a distance of 1 m.
3. **Processor Response**: The variation in output level with frequency for a constant input signal of 0.775 V = 0 dB reference.
4. **Beamwidth**: Average angle for each 1/3 octave frequency band where, starting from the rear of the loudspeaker, the output first reaches -6 dB SPL referenced to 0 dB SPL as the highest level. This method means the output may drop below -6 dB SPL within the beamwidth angle.
5. **Impedance**: Variation in impedance magnitude, in ohms, with frequency without regard to voltage/current phase. This means the impedance values may not be used to calculate True Watts (see 9 above).
6. **Polar Data**: Horizontal and vertical polar responses for each 1/3 octave frequency band 100 Hz to 16 kHz or Operating Range.



LC-32LS510UT	LC-22LS510UT	LC-19LS410UT
32" Class (31-35/64" Diagonal)	22" Class (21-1/2" Diagonal)	19" Class (18-1/2" Diagonal)
No	No	No
16:9	16:9	16:9
TFT LCD	TFT LCD	TFT LCD
1920 x 1080	1920 x 1080	1366 x 768
No	No	No
No	No	No
No	No	No
60Hz	60Hz	60Hz
30,000:1	1,000,000:1	1,000,000:1
176° H / 176° V	170° H / 160° V	170° H / 160° V
Edge lit LED	Edge lit LED	Edge lit LED
ATSC/QAM/NTSC	ATSC/QAM/NTSC	ATSC/QAM/NTSC
6.5ms	5ms	5ms
10W + 10W	3W + 3W	3W + 3W
No	No	No
Yes	Yes	Yes
4	2	2
No	No	No
Yes (photos/music)	Yes (photos/music)	Yes (photos/music)
No	No	No
2	1	1
No	No	No
1	1	1
3	2	2
1	1	1
9-pin x 1	9-pin x 1	9-pin x 1
1	1	1
120V, 60Hz	120V, 60Hz	120V, 60Hz
86W	34W	28W
30-31/32 x 21-1/16 x 9-3/8	21-3/32 x 14-21/32 x 6-11/16	18-7/16 x 13-3/16 x 6-11/16
30-31/32 x 19-11/16 x 1-25/32	21-3/32 x 13-15/32 x 1-17/32	18-7/16 x 11-31/32 x 1-17/32
22.5/19.4	9.77/8.82	8.16/7.21

LS510/410 SERIES

The LS510/410 Series expands the breadth of AQUOS LED LCD TV offerings with a contemporary, ultra-thin design and high-quality performance. A powerful TFT LCD panel combined with an edge lit LED backlight system provide high contrast ratios for deep blacks and vibrant colors in dark or bright scenes. These models are compliant with ENERGY STAR® program requirements for televisions, Version 4.1. They come equipped with HDMI® inputs for convenient connection to HD-capable devices, a headphone mini-jack for easy speaker connections and USB Media player. They feature a black cabinet and easily removable table stand for wall mounting applications.

KEY FEATURES

- Full HD 1080p (1920 x 1080) Resolution (LC-32/22LS510UT)
- True16:9 Aspect Ratio (1366 x 768) Resolution (LC-19LS410UT)
- Edge lit LED
- Wide Viewing Angles (176° H x 176° W) (LC-32LS510UT)
- USB Media Player
- PC Input
- Vyper Drive
- 4 HDMI® (LC-32LS510UT)
  2 HDMI® (LC-22LS510UT, LC-19LS410UT)

AVAILABLE SCREEN CLASS SIZES:

32", 31-1/2" Diagonal

22", 21-1/2" Diagonal

19", 18-1/2" Diagonal

VYPER DRIVE

Think GREEN

AQUOS LED

SeePoint™
Interactive Kiosk Systems

VantagePoint™

Vandal Resistant
Economical
Elegant
Secure
Modular
Durable

Shown with 19" LCD, Optional Signage and Optional Keyboard-TrakBall

Integrated Freestanding Internet Ready Touch Screen Kiosk

Features

- Metal or Injection Molded Plastic Computer Enclosure
- No Exposed Cables, Wires or Ports
- Small Footprint
- Premium Quality Components
  - 15" 17" or 19" Active Matrix LCD
  - Intel High Power Computer System
  - Responsive Touch Screens
- Internet Ready
- Plug and Play

Applications

- Retail Sales & Customer Services
- Healthcare
- Food Ordering - QSR
- Government Services
- Hospitalilty
- Visitor Information
- Ticketing Systems
- Automation & Control Systems
- Human Resource Programs
- Certification & Testing

Options

- Bar Code Readers
- Magnetic Card Readers
- Stereo Speakers
- Cameras
- Telephones
- Tamper Proof & Moisture Resistant Keyboards
- Integrated Wireless Connectivity
- Biometric Devices
- Check Readers (MIRC)
- mPale Antibacterial Coating
- HIPPA Privacy Filter
- Printers

Branding Opportunities

- Overhead Signage
- Bezel Silk Screening
- Custom Add-ons

888.587.1777

VantagePoint

Questions? Call 888.587.1777

Completely Integrated Free Standing Touch Screen Kiosk System

The VantagePoint Is Thin. The VantagePoint kiosk, which is less than 17.5 inches deep, is a sleek and elegant yet durable kiosk system ideal for self service applications. The VantagePoint offers all the functionality and features of a traditional cabinet kiosk with a revolutionary slim profile. The VantagePoint also provides the stature, signage opportunities and visibility of a conventional kiosk in a fraction of the space.

The VantagePoint Is Good Looking. The VantagePoint stand is constructed from vandal resistant steel and may be manufactured in any color to give the kiosk a unique or brand reinforcing appearance or to compliment the décor of the installation site. Additionally, an acrylic overlay may be mounted to the kiosk front and a replaceable billboard may be attached to the top of the system so signage may be prominently displayed on the kiosk. The entire system can be manufactured in stainless steel for a designer look with increased corresion protection.

The VantagePoint Knows How Accessorize. A host of peripheral devices may also be fully and securely integrated into the VantagePoint kiosk. Optional devices for the VantagePoint include bar code scanners, stereo speakers, magnetic swipe readers, tamper and moisture resistant keyboards, digital video cameras, badge readers, scanners and wireless Internet. When upgraded to the VantagePoint Print the system can support receipt, ticket and full size printers.

The VantagePoint Is Ready to Perform. Powered by the SeePoint Patented Kiosk computer, the VantagePoint provides robust and responsive multimedia computing for a dynamic interactive experience as well as high uptime and availability of your critical kiosk applications. With fast processing power, full-screen video and high quality sound, the VantagePoint is ideal for user-driven, self service applications. The VantagePoint is Windows and Linux compatible, using a standard, open architecture designed to run your software and applications that are off-the-shelf, from independent software vendors or your in-house team.

VantagePoint is a reliable, cost effective solution ideal for easy, rapid and wide spread installation. To create an instantaneous self service solution, just remove the kiosk system from its box, plug it in and load your website or custom application. Unlike many products, VantagePoint is a fully integrated kiosk system that does not require any on-site assembly, cabling or wiring.

Celeron / Core2Duo Board Configuration

LCD DISPLAY OPTIONS::
15” Active Matrix 360 NIT LCD Panel (1024 x 768)
17” Active Matrix 360 NIT LCD Panel (1280 x 1024) (Steel Bezel)
19” Active Matrix 360 NIT LCD Panel (1280 x 1024) (Steel Bezel)
17” High Bright Active Matrix 1000 NIT LCD Panel

TOUCH SCREENS:
Surface Acoustic Wave
Resistive Touch
HIPAA Compliant Privacy Touch with SAW Technology
AEGIS Antimicrobial Coated Touch Screens

COMPUTER:
Intel® Core™ 2 Duo / Core™ Duo
Core™ 2 Solo / Core™ Solo Mobile CPU
Intel® 82945GM Express Chipset
Realtek RTL8111B PCI-E Gigabit LAN

MEMORY:
Two DIMMs up to 4GB 2-CH DDR2 533/667 SDRAM

GRAPHIC SUPPORT:
DVI, 2x 18/24*-bit LVDS, Dual View
Intel® DVMT 3.0 supports 224 MB video memory
Intel® Graphics Media Accelerator 950

AUDIO:
Realtek ALC888 5.1+2 CH 5W Amplified Audio
Supports Dual Audio Stream

MULTI I/O:
1 x PS/2 Keyboard
1 x PS/2 Mouse
2 x RS-232
1 x VGA port
1 x DVI port
4 x USB 2.0/1.1
1 x RJ45 Port
5.1 CH Audio I/O (3 jacks)

STORAGE:
Shock Mounted Sata Hard Drive (160 or 300 GB)
Solid State Flash Disk (1GB or 2GB)

HARDWARE MONITORING:
Monitoring for CPU and system temperature, voltage and fan speed

EXPANSION SLOTS: (not customer accesible)
1 x PCI slot, 1 x Mini PCI, 1 x CF

OPERATING SYSTEMS:
XP PRO / WEPOS / WindowsVista

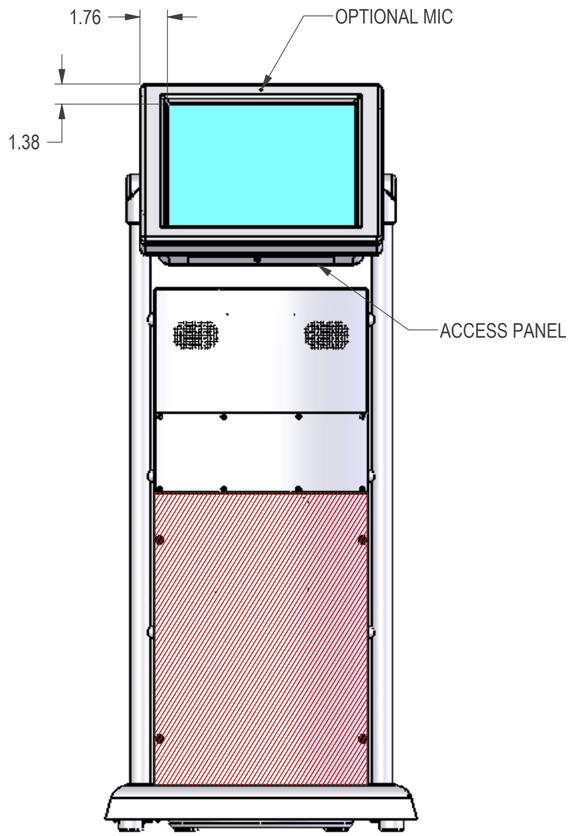
ENVIRONMENT:
Operation temperature: 0C to 60C (32 F- 120 F)

WEIGHT:
120 LBS. (for all dimension PDFs see www.seepoint.com)

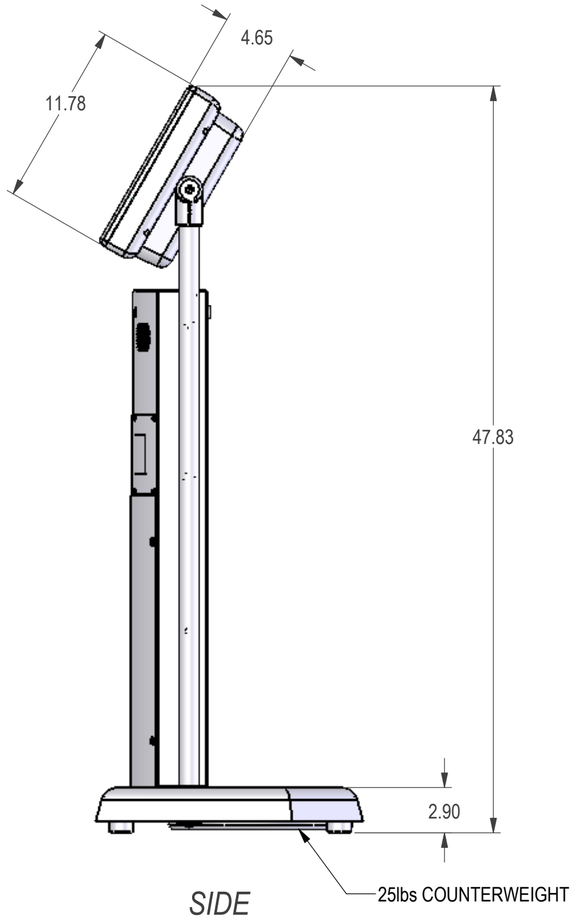
SeePoint™
Interactive Kiosk Systems

For more information call 888.587.1777 or visit
www.SeePoint.com
SeePoint, LLC.
2619 Manhattan Beach Blvd., Redondo Beach, CA 90278

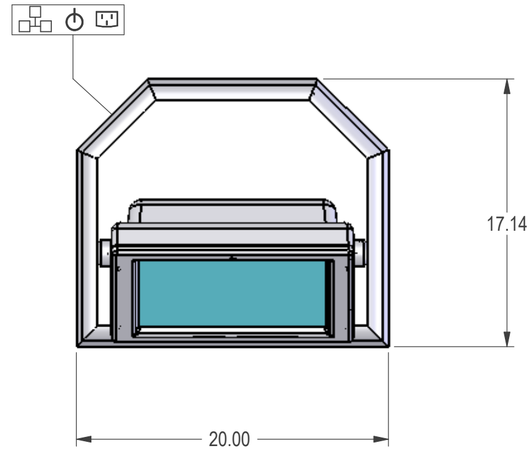
15" VantagePoint



FRONT

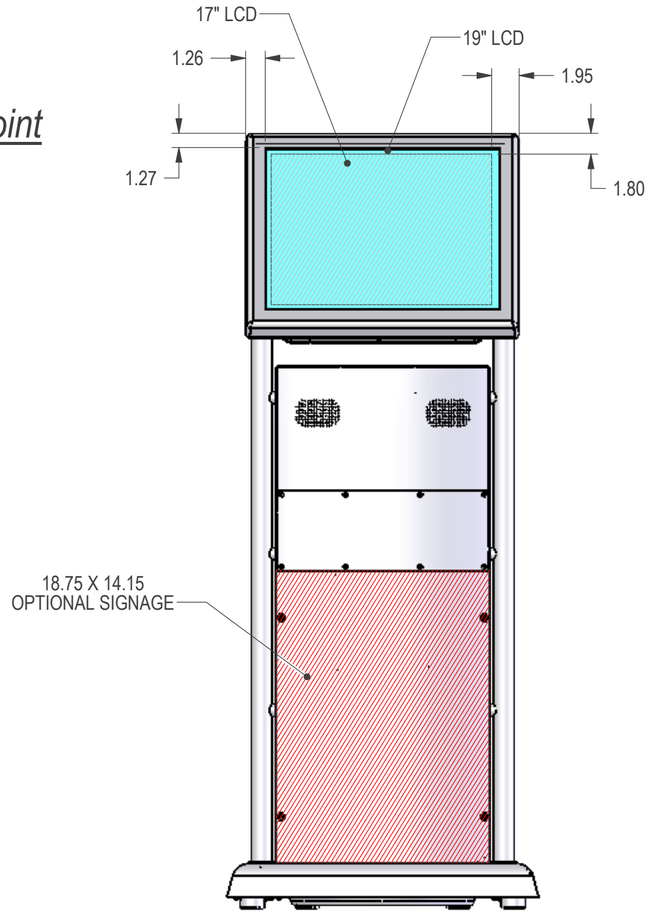


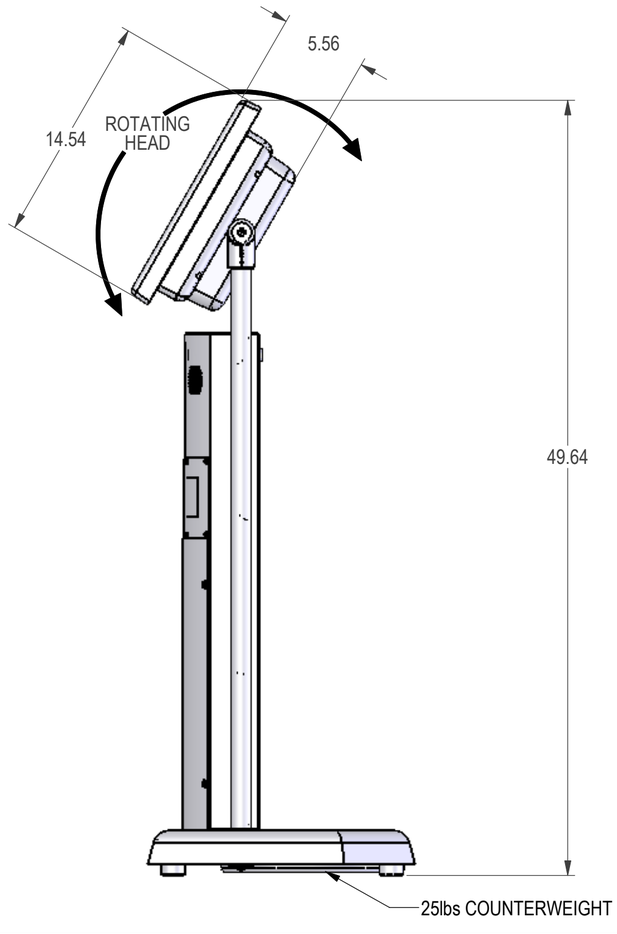
SIDE

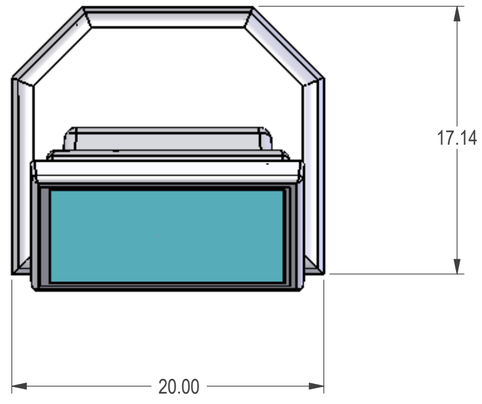


TOP

17"/19" VantagePoint







SeePoint™
Interactive Kiosk Systems
SeePoint.com 888-587-1777

TITLE			
VantagePoint			
SIZE C	PART NO.	DWG NO. SP061203-05	REV N/C
DO NOT SCALE/PRINT REDUCED		SCALE NONE	

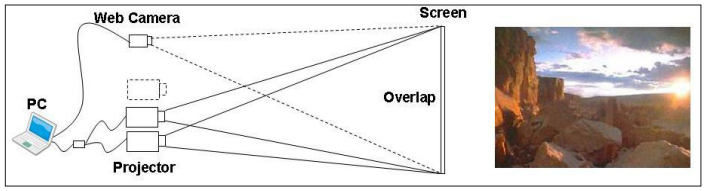
NP Installation Series

NP3250/NP3250W/NP2250/NP1250 digital installation projectors

Powerful installation projectors equipped to take on the most demanding integration projects.

FLEXIBILITY ENABLES PERFORMANCE

° The industry's first built-in stacking correction capabilities (up to four projectors) allows the projectors to boost an image's brightness up to 20,000 lumens, which is ideal for larger-sized screens and environments with heavy ambient light. This feature also prevents the complete loss of an image, which can happen when using only one projector.



° Integrated Device Technology HQV™ is a high-performance video processing/scaling system designed for computer signals as well as standard or high-definition video. The technology produces superior video processing using pixel-based, motion-adaptive de-interlacing to remove undesirable motion artifacts typical of interlaced signals. This processing creates life-like images in applications such as video conferencing.
° Bright enough for most applications: 5000 lumens (NP3250), 4000 lumens (NP3250W), 4200 lumens (NP2250) and 3700 lumens (NP1250)
° Geometric correction tool allows you to project on spheres, cylinders and more

INTEGRATED NETWORKING AND ASSET MANAGEMENT

° Integrated RJ45 connection for quick connection to the LAN (10/100 base-T capability)
° Integrated high-speed wireless LAN IEEE 802.11b/g
° Desktop control allows you to securely transmit information wirelessly to the projector from a docking station or PC in another room
° Image Express Utility (IEU 2.0; compatible with Windows or Mac operating systems) dedicated projector software provides wired and wireless data transmission via peer-to-peer or over the network
  • Broadcast mode allows you to send information from one computer to several projectors
° Windows Network Projector function within Windows Vista connects directly to networked projectors without the need for additional proprietary software
° Windows Remote Desktop function allows you to control a networked computer by connecting a USB mouse and keyboard directly to the projector's USB input
° Windows Network Drive Function displays multimedia files (.jpeg, .bmp, .png, .mpeg2 or .wmv9) in the Windows shared folder on a local network using the Viewer function—all without bringing your PC into the conference room
° Windows Media Connection Function displays multimedia files (.mpeg2, .jpeg or .wmv9) stored on the Windows Media Connect server or a local network using the Viewer function—all without bringing your PC into the conference room

SECURITY FEATURES PROVIDE PEACE OF MIND

° Cabinet control lock setting enables user to deactivate buttons on cabinet to prevent unwanted changes to projector settings
° Logo lock restricts changes to logo saved in projector memory
° Password protection restricts unauthorized use of projector
° Email notification informs the system administrator when the lamp approaches the end of its useful life

EXTENDING THE LIFE OF THE PROJECTOR

° ECO Mode™ technology increases lamp life by up to 50%
° Direct power off protects the lamp by enabling the cooling fan to continue running after power is disconnected
° Lamp saver technologies enable the cooling fan to continue running even after the power source is disconnected. Built-in sensors protect the lamp and projector from overheating.
° Sleep timer can be set to automatically turn off the projector

Series Features and Benefits

STACKING CAPABILITY

VERTICAL AND HORIZONTAL LENS SHIFT

HQV™ PROCESSING

WINDOWS NETWORK PROJECTOR

REMOTE DESKTOP CONNECTION

COMPLETE LINE OF (5) BAYONET STYLE LENSES

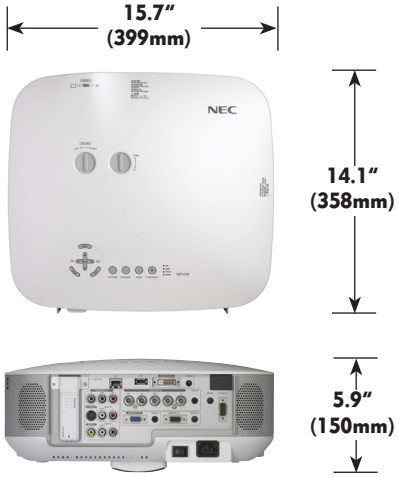
POWERFUL INTEGRATED NETWORKING AND ASSET MANAGEMENT

REMOTE DIAGNOSTICS

COMPREHENSIVE INPUT PANEL

3D REFORM WITH GEOMETRY CORRECTION

LAMP SAVER TECHNOLOGIES



UNIQUE FEATURES

3D Reform™ allows you to square the image by adjusting horizontally, vertically or diagonally when the projector cannot be placed parallel or perpendicular to the screen

Advanced AccuBlend™ ensures detailed images when non-native resolution sources are connected to the projector

Built-in wall color correction presets provide for adaptive color tone correction to display properly on non-white surfaces

AutoSense™ automatically syncs with any computer signal and features one-touch image optimization

64-step image magnification with location control

Discreet source keys for source selection

Computer-free presentations via USB drive or PCMCIA card inserted directly into the projector allows you to change images using the wireless remote control provided

Remote diagnostics enable the user to monitor and make adjustments to the projector remotely

Built-in HTTP page for control and monitoring over a LAN network. Email notification of error messages or lamp end-of-life can be sent to remote locations.

Flexible video/data connections, including S-video, component video, DVI with HDCP, composite video, two computer inputs (1-HD15 and 1-RGBHV) and monitor output

Vertical and horizontal lens shift enables flexible projector placement

PIP/ESS allows two sources to be displayed on the screen at one time in either a picture-in-picture or side-by-side configuration

WARRANTY

Registered owners receive a 3-year parts and labor warranty including the first year of InstaCare. The lamp is covered for one year or 500 hours, whichever comes first. InstaCare provides the original owner one year of either limited 3 business day repair/return or next business day exchange.

IN THE BOX

Remote control, remote control cable, batteries, power cord, RGB signal cable, lens cap, user's manual on CD-ROM, quick start guide, product registration card, wired and wireless network setup guide, PC Card lock, lens anti-theft screw

Specifications for NP3250/NP3250W/NP2250/NP1250

OPTICAL	
Display Technology	NP3250/NP2250/NP1250: 0.8" LCD with MLA NP3250W: 0.74" LCD with MLA
Resolution	
Native	NP3250/NP2250/NP1250: XGA 1024 x 768 NP3250W: WXGA 1280 x 800
Maximum	UXGA 1600 x 1200
Light Output (lumens)	NP3250: 5000 normal NP3250W: 4000 normal NP2250: 4200 normal NP1250: 3700 normal
Contrast Ratio	NP3250/NP2250/NP1250: 600:1 NP3250W: 500:1
Lamp Type	330W AC
Lamp Life (up to)	2000 hours normal / 3000 hours eco
Screen Size (diagonal)	25 to 500 in, 635 to 12,700mm
Throw Ratio	1.5 to 2.0 (standard lens)
Projection Distance	2.5 to 68.5 ft, 0.74 to 20.9 m
Projection Angle	10.3 to 10.8° tele / 13.7 to 14.5° wide
Lens	
Zoom	1 to 1.33
Focus	Manual
F-number	F = 1.7 to 2.2, f = 24.4 to 32.5mm
Shift	Manual: 50% vertical, 10% horizontal
Keystone Correction	+/- 40 degrees horizontal, +/- 30 degrees vertical
SIGNAL COMPATIBILITY/CONNECTIVITY	
Scan Rate	Horizontal 15 – 108 kHz / Vertical 48 – 120 Hz
Supported Video Standards	NTSC, NTSC4.43, PAL, PAL-60, PAL-M, PAL-N, SECAM
SD/HD Video Signal Compatibility	1080i, 720p, 576p, 576i, 480p, 480i
PC Signal Compatibility	VGA, SVGA, XGA, SXGA, SXGA+, UXGA
Macintosh Compatibility	Yes
Input/Output Terminals	
RGB 1 (analog)	15 pin
RGB2 (analog)	5-BNC
RGB3 (digital)	DVI-D w/ HDCP
Video 1	RCA
Video 2	S-Video
Video 3	Component
Audio	(2) L/R RCA, (3) mini stereo
Audio Out	mini VAO
Monitor Out	Yes
Audio	5W stereo
External Control	RS-232, IR
Sync Compatibility	Separate Sync / Composite Sync / Sync on G
ELECTRICAL	
Power Req.	100 – 240V AC, 50/60Hz
Input Current	NP3250/NP3250W: 5.9A NP1250/NP2250: 5.5A
Power Consumption	NP3250/NP3250W: 490W NP1250/NP2250: 460W
MECHANICAL	
Installation Orientation	Floor/Front, Floor/Rear, Ceiling/Front, Ceiling/Rear
Dimensions (WxDxH)	15.7 x 14.1 x 5.9 in. / 399 x 358 x 150mm
Net Weight	16.1 lbs / 7.3 kg
Fan Noise	NP3250/NP3250W: 38dB normal/31dB eco NP2250: 34dB normal/30dB eco NP1250: 33dB normal/30dB eco
Regulations	USA UL 1950 FCC Class B, Canada CSA950 (C-UL), NOM
ENVIRONMENTAL	
Operational Temp	41° – 104°F / 5° – 40°C
Humidity	20-80% non-condensing
Storage	14° – 122°F / -10° – 50°C
ACCESSORIES	
NP06LP	Replacement lamp
NP3150CM	Ceiling mount
NP3150TCover	Input terminal cover
NP1000TC	Rolling case with extension handle
NP1000ATA	ATA certified case for shipping and secure storage
SCP100	Suspended ceiling plate
NP01FL	0.8:1 fixed short throw lens
NP02ZL	1.18 – 1.54:1 zoom lens
NP03ZL	1.94 – 3.07:1 zoom lens
NP04ZL	2.98 – 4.77:1 zoom lens
NP05ZL	4.62 – 7.02:1 zoom lens
PW RCRD-PJPX	Power cable
RGBCBL-PJPX	RGB cable
RMT-PJ26	Replacement remote
NECEW2-I	Extends term of parts and labor warranty to 4 years
ADVEXON1-I	Extends term of InstaCare service program to 2 years
ADVEXON2-I	Extends term of InstaCare service program to 3 years
NECECO	Projector recycling program, disposal certificate

Additional accessories are available, including screens, carts, mount accessories and replacement cables. Visit www.necdisplay.com for details.

NEC Display Solutions
500 Park Boulevard, Suite 1100
Itasca, IL 60143
866-NEC-MORE

NEW

WD380U-EST WIDE WXGA
XD360U-EST

Brilliant Color™ | Color Enhancer | Wall Screen | 10W Speaker | User Logo Projection | Password Lock
Instant Shutdown | Long-life Lamp | Low Stand-by Power | Top/Side Loading Lamp | LAN (RJ-45) | HDMI
Closed Caption | Low Fan Noise

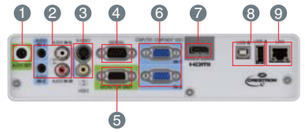
Picture Performance | Presentation | User-friendly

PICTURE BY DLP TEXAS INSTRUMENTS

DLP™ 3D READY

Input and Output Terminals

(WD380U-EST/XD360U-EST)



1. Audio output
2. Audio input
3. S-Video/Video
4. Serial RS-232C
5. Monitor output
6. PC/Component video input
7. HDMI
8. USB
9. LAN (RJ-45)

Specifications

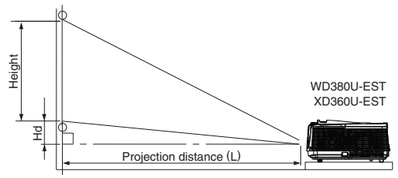
Model	WD380U-EST	XD360U-EST
Display technology	0.65" 1-Chip DMD	0.55" 1-Chip DMD
Resolution	1280 × 800 (Total 1,024,000 pixels)	1024 × 768 (Total 786,432 pixels)
Brightness	2800lm	2500lm
Contrast ratio	3000 : 1	
Picture size	70" – 180"	60" – 150"
Throw ratio	0.375	0.469
Source lamp	Normal Mode: 230W (Shut Off Time: 3000hrs), Low Mode: 190W (Shut Off Time: 6000hrs)	
PC compatibility	640 × 480 – 1280 × 800 – 1600 × 1200, 1080p Sync on Green available	640 × 480 – 1024 × 768 – 1600 × 1200, 1080p Sync on Green available
Video compatibility	NTSC / NTSC 4.43 / PAL (including PAL-M, N) / SECAM / PAL-60 Component Video; 480i/p (525i/p), 576i/p (625i/p), 720p (750p), 1080i/p (1125i/p 60Hz) 1080i/p (1125i/p 50Hz)	
Input terminals	RGB: mini D-sub 15pin × 2 Audio; Stereo mini jack (φ3.5mm) × 2 (one for PC1, another one for PC2) Video; RCA × 1 + S-VIDEO × 1 Digital: HDMI × 1 Video Audio; RCA jack (L/R) × 1	
Output terminals	RGB; mini D-sub 15pin × 1 Audio; Stereo mini jack (φ3.5mm) × 1	
Communication terminal	SERIAL: mini D-sub 9pin × 1 (RS232C) LAN (RJ-45): × 1 (Projector control, LAN Display) USB type-A; Wireless Display, PC Less Presentation USB type-B: USB Display	
Audio speaker	10W Mono	
Dimensions (W x H x D)	12.8" x 4.4" x 10.2"	
Weight	4.1 kg (9.0 lbs)	
Power requirements	AC 100 - 240V, 50/60Hz	
Optional lamp	VLT-XD560LP	

• Compliance with ISO21118-2005

Varies depended on condition:
•All brand names and product names are trademarks, registered trademarks or trade names of their respective holders.
•Lamp life specification is an estimate based on verification under proper conditions and is not the duration of the warranty. Lamp will shut-off automatically when usage reaches the specified estimated maximum lamp hours. Service life may vary widely depending on usage and operating environment and conditions, as well as users' adherence to the maintenance and cleaning procedures provided in the user manual.

Screen Size and Projection Distance

Side view



The above numbers are approximate, and may be slightly different from the actual measurements.

Screen size chart (WD380U-EST)

Screen (16 : 10)						Distance from screen (L)		Height projected image (Hd)	
Diagonal size		Width (W)		Height (H)					
inch	cm	inch	cm	inch	cm	inch	m	inch	cm
66	168	56	142	35	89	20	0.52	4.4	11
75	192	64	163	40	102	24	0.60	5.0	13
94	240	80	203	50	127	30	0.77	6.3	16
113	288	96	244	60	152	37	0.93	7.5	19
142	359	120	305	75	191	46	1.18	9.4	24
170	431	144	366	90	229	56	1.43	11.3	29

Screen size chart (XD360U-EST)

Screen (4 : 3)						Distance from screen (L)		Height projected image (Hd)	
Diagonal size		Width (W)		Height (H)					
inch	cm	inch	cm	inch	cm	inch	m	inch	cm
60	152	48	122	36	91	22	0.56	5.4	14
80	203	64	163	48	122	30	0.77	7.2	18
100	254	80	203	60	152	38	0.97	9.0	23
120	305	96	244	72	183	46	1.18	10.8	27
150	381	120	305	90	229	58	1.49	13.5	34

eco Changes **for a greener tomorrow**

Eco Changes is the Mitsubishi Electric Group's environmental statement, and expresses the Group's stance on environmental management. Through a wide range of businesses, we are helping contribute to the realization of a sustainable society.

MITSUBISHI DIGITAL ELECTRONICS AMERICA, INC.
Presentation Products Division
Phone: 888.307.0349
www.mitsubishi-presentations.com

MITSUBISHI ELECTRIC
PRESENTATION PRODUCTS

MITSUBISHI ELECTRIC SALES CANADA, INC.
Display & Imaging Solutions Division
Phone: 905.475.7728
www.mitsubishielectric.ca

New publication, effective April 2011.
Specifications subject to change without notice.

MITSUBISHI ELECTRIC

Changes for the Better

MULTIMEDIA DATA/VIDEO PROJECTORS

Impressive Ultrashort-throw Focus

Specially crafted lens

NEW

WD380U-EST WIDE WXGA
XD360U-EST

eco Changes **for a greener tomorrow**

Interference-free Projection…
Even in the Tightest of Spaces.

Short-throw-focus projectors designed for small classrooms and meeting rooms

NEW WD380U-EST WIDE WXGA
X D360U-EST

Conventional projectors have the problems of needing to be placed back far from the screen to project large images, thereby requiring a large room, and someone always seems to get in the projection path, interrupting the view.
Mitsubishi Electric's WD380U-EST and XD360U-EST mobile projectors are equipped with a specially crafted lens that provides the best short-throw-focus performance in the industry.* Even in classrooms and meeting rooms with limited space, large-screen visual communication free of interference is now possible.

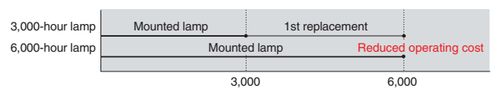
*Units not equipped with mirrors

Manufacturing Products that Minimize Environmental Impact

Ecology

6000-hour Long-life Lamp (max. use set to Low mode)

A longer service life for the projection lamp has been achieved by incorporating an optimal design for lamp temperature control. Benefits include substantial reductions in projector operating cost and the labor required for changing the lamp.



•Lamp life specification is an estimate based on verification under proper conditions and is not the duration of the warranty. Lamp will shut-off automatically when usage reaches the specified estimated maximum lamp hours. Service life may vary widely depending on usage and operating environment and conditions, as well as users' adherence to the maintenance and cleaning procedures provided in the user manual.

Auto Power Off

If no image signal is output for a predetermined period of time*, power is automatically turned off, realizing energy savings by reducing needless power consumption.

*Time preset by user

Stand-by Wattage under 0.3W*

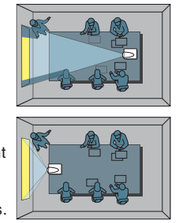
Stand-by (low) mode power consumption is less than 0.3W, offering increased energy savings and further contributing to environmental preservation.

*When in stand-by (low) mode. At this time, use of the LAN function, RS-232C output and Remote 1 is not possible.

Presentation

World Shortest Focal Distance – 0.375 Throw Ratio (WD380U-EST)/80in

*XD360U-EST throw ratio: 0.469
Note: Data researched by Mitsubishi Electric in March 2011.

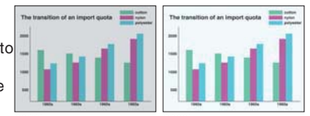


Utilizing a large-diameter lens and optimal optical engine design, the shortest focal distance (throw ratio: 0.375) in the industry has been achieved. Even if the teacher or presenter must move in front of the projected image, they are neither blinded nor disturbed by projector light, enabling them to maintain eye contact with the audience at all times.

2800lm High Luminance (WD380U-EST)

*XD360U-EST: 2500lm

The high 2800lm luminance (2500lm for XGA models) helps to ensure presentation images are clearly seen without lowering the light in the room.



2000lm 2800lm
*Image brightness comparison

3000:1 High Contrast

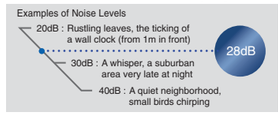
Dark chip3 is newly introduced to the DLP®chip line-up. Stray-light processing has been optimized for the optical system, achieving a high contrast of 3000:1. This makes it possible to reproduce sharp, vivid images in which sentences and other characters can be easily read.

3D READY – Enjoy the future today

User Friendly

Ultra Quiet 28dB Operation

Fan noise during projector operation can be distracting during a presentation or videoconference. The WD380U-EST and XD360U-EST projectors operate at a significantly low noise level of only 28dB (i.e., in "low lamp" mode). As a result, presentations and conferences can be held without distracting projector noise in the background.

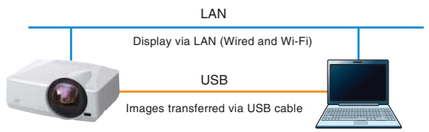


Top-loading lamp for easier maintenance

Network

USB Display/LAN Display

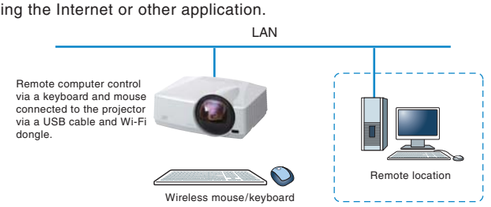
To use the projector to reproduce images from a computer, a VGA cable, USB cable, LAN cable or commercially available wireless dongle can be used. For displaying images via a LAN, up to four computers can be connected to one projector. The projection screen can be divided into quarters, reproducing all computer screens simultaneously.



Notes:
1) Only one optional USB Type-A port from a computer can be directly connected to a projector. Multiple connections using a USB hub is not possible.
2) For displaying images via a LAN, network settings are required.
3) Not all USB dongles are compatible.

Remote Desktop

When using the LAN Display function, a USB mouse or USB keyboard can be connected to the projector enabling direct access to a computer utilizing the Internet or other application.



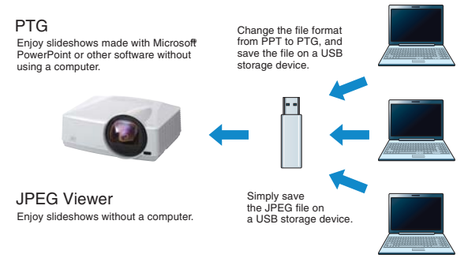
Computer-free Presentations (PTG file/JPEG Viewer)

Using "PtG Converter", PowerPoint files can be converted into a special format and saved on a USB storage device. When the USB device is connected to the projector, users can replay slideshows or animation effects using only the projector.

Note: The types of slideshows and animation effects that can be replayed are limited.

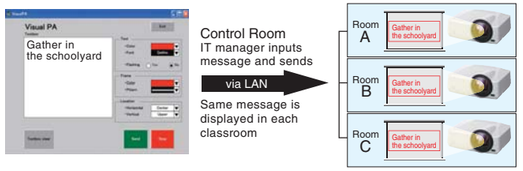
JPEG files saved on a USB storage device can be projected in slideshow style.

Note: Only compatible with JPEG files.



Simultaneous Message Display (Visual PA)

Using a control room computer equipped with projector-control software, administrators can simultaneously send messages (up to 350 characters long) in real-time to projectors connected to the LAN. Ideal for broadcasting important information to multiple rooms in the school or building.



Network Connectivity

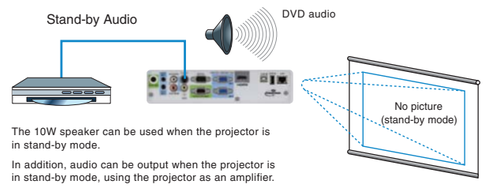
Projectors are equipped with a RJ-45 LAN terminal for remote operation. Additionally, when used with Crestron®Room View®, integrated control of up to 250 projectors including power on/off control, messag display and confirmation of lamp service hours is possible using RoomView™/ e-Control™. Both projectors are equipped with AMX Device Discovery for simplified device management and compatible with PJLink™.

PJ Link is a registered trademark or trademark registration has been submitted in Japan, the United States and other countries/regions.

Audio

Stand-by Audio/Audio Pass-through

When the projector is in stand-by mode, its 10W speaker can still be used. Additionally, while in stand-by mode, an external speaker can be used by connecting it via the Audio Out terminal.



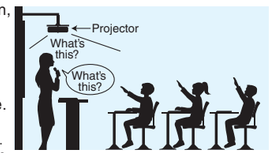
The 10W speaker can be used when the projector is in stand-by mode.

In addition, audio can be output when the projector is in stand-by mode, using the projector as an amplifier.

Excellent Sound Projection (10W Speaker+Audio Mix)

A high-volume, 10W speaker is built-in, eliminating the need for an external speaker. Using the "Audio Mix*" feature and wireless microphone sold separately, the presenter's voice is reproduced loud and clear in real time.

*Only compatible with stereo mini-jack. Not compatible with RCA jack (L/R) or HDMI.
*10W speaker and external speaker cannot be used at the same time.



MARK SERIES HIGH INTENSITY DMX CONTROL STROBES

3 MODELS FEATURING

- **9 ULTRA BRIGHT HYPER FLASH MODES, WITH HYPER BLASTER**
- **1-60 Flashes/second on 1 Channel, Fixed Intensity Blaster; No Step Down**
- **1-20 Flashes/second on 2 Channel Mode; Variable Rate & Intensity**
- **1-12 Flashes/second Stand Alone on Unit Rotary Pot Adjustment**

ANALOG OR DMX OPERATION - SHOW CONTROL CAPABLE

2 FIELD, WIDE & NARROW - CERAMIC LAMP MOUNT

MARK 2000 (0432)	MARK 3600 (0416)	MARK 5000 (0427)
95-120 V, 15 Amp, 50/60 Hz 2000 Watt Avg. Strobe Mode 12K Peak Hyper Mode Lamp Life - 10 million flashes	205-240 V, 20 Amp, 50/60 Hz 3600 Watt Avg. Strobe Mode 30K Peak Hyper Mode Lamp Life - 5 million flashes	DISCONTINUED

ACCESSORIES

SK-XLR - Striker Remote - 0422 - Analog, Models - MARK 2000, 3600 & 5000
SR-DMX - Strobe Runner - 0483 - 120V - MARK 2000
SR-DMX - Strobe Runner - 0484 - 240V - MARK 3600 & 5000

Linear Lamp - 0433 (MARK 2000); 0411 & 0459 (MARK 3600); - 0415 (MARK 5000)

MECHANICAL

Model 0432 - 16.00" (40.6 cm) Wide X 7.0" (17.8 cm) High X 7" (17.8 cm) Deep; Weight 9 lbs. (4.1 kg)
Model 0416 - 19.75" (50.2 cm) Wide X 8.5" (21.6 cm) High X 8" (20.3 cm) Deep; Weight 12 lbs. (5.45 kg)
Model 0427 - 22.50" (57.2 cm) Wide X 8.5" (21.6 cm) High X 8" (20.3 cm) Deep; Weight 15 lbs. (6.8 kg)

United States Patent No. 6,271,634 (MARK 3600 & MARK 5000)

FEATURES

- Ultra-compact two-way system
- 5.25-in LF/1-in tweeter
- Magnetically shielded for use with video monitors
- High-output, high-definition sound from an ultra-compact enclosure

DESCRIPTION

Despite its compact size, the UB12Si will faithfully deliver high-output, high-definition sound for a wide variety of professional applications. All system elements, including drivers, crossover/filter components, and the enclosures themselves are designed to meet EAW's rigorous standards for reliablility and durability.

The system operates in fully passive mode with an internal passive crossover/filter network both dividing the signal and providing critical equalization functions.

Each UB12Si includes a robust 5.25-in woofer mounted in an optimally vented enclosure and a 1-in soft dome tweeter specifically designed to provide smooth, studio-quality high-frequency reproduction.

APPLICATION

As a stand alone system, the UB12Si delivers full range output at surprisingly high levels with flat response for a wide range of professional audio applications including multimedia production and presentation, corporate audio/visual systems, retail spaces, project recording studio, and home theaters. It is also a popular choice as a secondary distributed reinforcement system providing additional coverage in virtually any large scale installation such as theaters, performing arts centers, houses of worship and even arenas and stadiums.The ultra-compact enclosures can be unobtrusively mounted almost anywhere. The system includes 1/4-in threaded mounting points, two sets of which are configured to accept an Omnimount Series 20.5. They are also magnetically shielded for use in immediate proximity to video monitors making them an excellent choice for any multimedia application.

2-WAY FULL-RANGE ULTRA-COMPACT LOUDSPEAKER

See *NOTES TABULAR DATA* for details

PERFORMANCE

Frequency Response *(1 W @ 1m)*:

±3 dB	98 Hz to 20 kHz
-10 dB	60 Hz

Axial Sensitivity *(dB SPL, 1 W @ 1m):* 89

Impedence *(Ohms):* 8

Power Handling, AES Standard *(Watts):* 140*

Calculated Maximum Output *(dB SPL @ 1m):*

Peak	116.5*
Long Term	110.5*

Nominal Coverage Angles, -6 dp Points *(degrees):*

Conical	120

Recommended High-Pass Frequency:

24 dB/Octave	60 Hz

PHYSICAL

Configuration	2-way, full-range
Powering	Passive LF/HF crossover
LF Subsystem	5.25-in cone, vented
HF Subsystem	1-in soft dome tweeter
Coverage Angles	120° (conical)
Cabinet Type (shape)	Rectangular
Enclosure Materials	MDF
Finish	Black polyurethane
Connectors	2-contact terminal strip, Neutrik NL4 Speakon
Suspension Hardware	(6) 1/4" -20 threaded mounting points (1 each top and bottom, 2 on each side to accept Omnimount 20.5)
Grille	Powder-coated perforated steel , foam backed

Companion Systems:

Sub	SB48zP
Accessories	U-Bracket (606001)

Dimensions:

	Inches	*Millimeter*
Height	10.75	273
Width	6.38	162
Depth	6.00	152

Weights:

	Pounds	*Kilograms*
Net Weight (each)	9.2	4.2
Shipping Weight (each)	12	5.4

Applications

- *MultiMedia*
- *Boardrooms*
- *Theaters*
- *Ballroom Events*
- *Restaurants*
- *Small Retail*

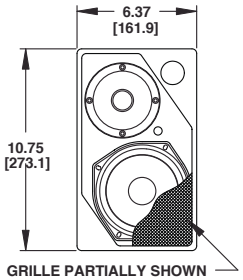
Eastern Acoustic Works One Main Street Whitinsville, MA 01588 tel 800 992 5013 / 508 234 6158 fax 508 234 8251 www.eaw.com

Part Number: 027773-90 June 2009

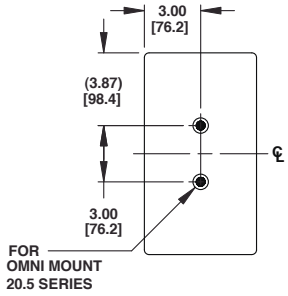
DIMENSIONAL DRAWING

UB12Si

NOTES:
1. SYMBOL ◉ INDICATES MOUNTING POINT, 1/4-20 THREADED HOLE.
2. SYMBOL ⊕ INDICATES CENTER OF BALANCE.
3. WEIGHT APPROX. 9.20 lb [4.2 kg].
4. SHIPPING WEIGHT APPROX. 12.00 lb [5.4 kg].

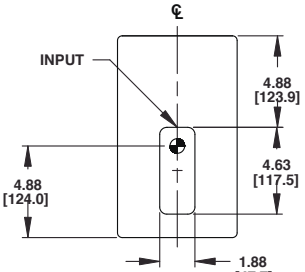


FRONT

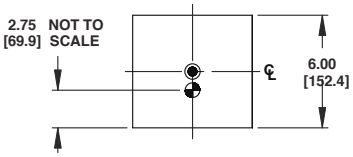


RIGHT SIDE

DIMENSIONS APPLY TO BOTH SIDES



BACK



TOP/BOTTOM

A & E SPECIFICATIONS

The two-way full-range loudspeaker system shall incorporate a 5.25-in LF transducers and a 1-in soft dome tweeter HF transducer.

The LF driver shall be mounted in a vented enclosure tuned for optimum low frequency response. The drivers shall be magnetically shielded for use in immediate proximity to video monitors. An internal passive filter network shall provide fourth order acoustical crossover and system equalization.

System frequency response shall vary no more than ±3 dB from 98 Hz to 20 kHz measured on axis. Operated with a high pass filter set a 90 Hz (24 dB /octave) the loudspeaker shall produce a Sound Pressure Level (SPL) of 89 dB SPL on axis at 1 meter with a power input of 1 Watt, and shall be capable of producing a peak output of 116.5 SPL on axis at 1 meter. The loudspeaker shall handle 140 Watts of amplifier power (AES Standard) and shall have a nominal impedance of 8 Ohms.

The loudspeaker enclosure shall be rectangular in shape. It shall be constructed of 3/4 thickness medium density fiberboard (MDF). It shall be finished in wear resistant textured black paint. Input connectors shall be 2-contact terminal strip and Neutrik NL4 Speakon. A total of six 1/4"-20 Threaded Mounting Points (1 each top and bottom, 2 on each side configured to accept an Omnimount Series 20.5) shall be provided. The front of the loudspeaker shall be covered with a powder coated perforated steel grille backed with open cell foam to protect against dust. The two-way full range loudspeaker shall be the EAW model UB12Si.

* Data indicate system performance in use with a 24 dB/oct. high-pass filter set at 90 Hz as is typical in most professional usage. Operation with the specified 60 Hz highpass frequency will yield 100 Watts power handling and a calculated peak output of 115.0 dB SPL @ 1m.

NOTES

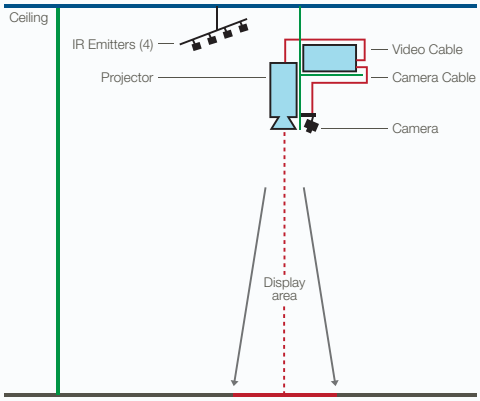
TABULAR DATA

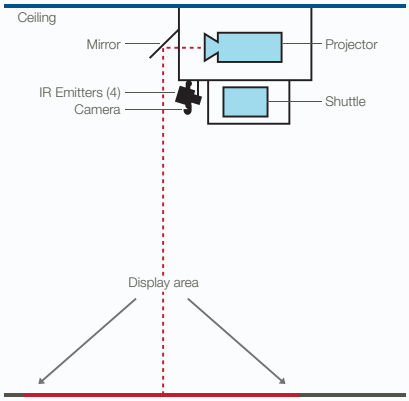
1. **Measurement/Data Processing Systems**: Primary - FChart: proprietary EAW software; Secondary - Brüel & Kjær 2012.
2. **Microphone Systems**: Earthworks M30; Brüel & Kjær 4133
3. **Measurements**: Dual channel FFT; length: 32 768 samples; sample rate: 48 kHz; logarithmic sine wave sweep.
4. **Measurement System Qualification** (includes all uncertainties): SPL: accuracy +/-0.2 dB @ 1 kHz, precision +/-0.5 dB 20 Hz to 20 kHz, resolution 0.05 dB; Frequency: accuracy +/-1 %, precision +/-0.1 Hz, resolution the larger of 1.5 Hz or 1/48 octave; Time: accuracy +/-10.4 µs, precision +/-0.5 µs, resolution 10.4 µs; Angular: accuracy +/-1°, precision +/-0.5°, resolution 0.5°.
5. **Environment**: Measurements time-windowed and processed to eliminate room effects, approximating an anechoic environment. Data processed as anechoic or fractional space, as noted.
6. **Measurement Distance**: 7.46 m. Acoustic responses represent complex summation of the subsystems at 20 m. SPL is referenced to other distances using the Inverse Square Law.
7. **Enclosure Orientation**: For beamwidth and polar specifications, as shown in Mechanical Specification drawing.
8. **Volts**: Measured rms value of the test signal.
9. **Watts**: Per audio industry practice, "loudspeaker watts" are calculated as voltage squared divided by rated nominal impedance. Thus, these are not True Watt units of energy as defined by International Standard.
10. **SPL**: (Sound Pressure Level) Equivalent to the average level of a signal referenced to 0 dB SPL = 20 microPascals.
11. **Subsystem**: This lists the transducer(s) and their acoustic loading for each passband. Sub = Subwoofer, LF = Low Frequency, MF = Mid Frequency, HF = High Frequency.
12. **Operating Mode**: User selectable configurations. Between system elements, a comma (,) = separate amplifier channels; a slash (/) = single amplifier channel. DSP = Digital Signal Processor. IMPORTANT: To achieve the specified performance, the listed external signal processing must be used with EAW-provided settings.
13. **Operating Range**: Range where the processed Frequency Response stays within -10 dB SPL of the power averaged SPL within this range; measured on the geometric axis. Narrow band dips are excepted.
14. **Nominal Beamwidth**: Design angle for the -6 dB SPL points, referenced to 0 dB SPL as the highest level.
15. **Axial Sensitivity**: Power averaged SPL over the Operating Range with an input voltage that would produce 1 W at the nominal impedance; measured with no external processing on the geometric axis, referenced to 1 m.
16. **Nominal Impedance**: Selected 4, 8, or 16 ohm resistance such that the minimum impedance point is no more than 20% below this resistance over the Operating Range.
17. **Accelerated Life Test**: Maximum test input voltage applied with an EIA-426B defined spectrum; measured with recommended signal processing and Recommended Protection Filter.
18. **Calculated Axial Output Limit**: Highest average and peak SPLs possible during the Accelerated Life Test. The Peak SPL represents the 2:1 (6 dB) crest factor of the Life Test signal.
19. **High Pass Filter**: This helps protect the loudspeaker from excessive input signal levels at frequencies below the Operating Range.

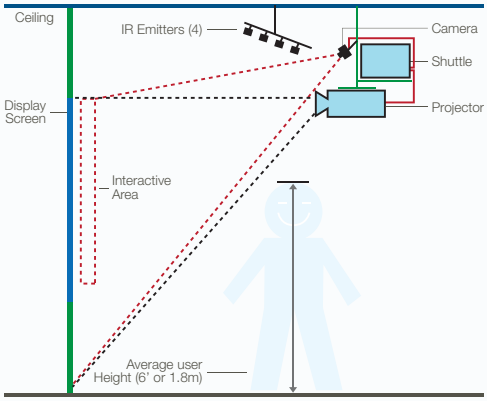
GRAPHIC DATA

1. **Resolution**: To remove insignificant fine details, 1/12 octave cepstral smoothing was applied to acoustic frequency responses and 1/3 octave cepstral smoothing was applied to the beamwidth and impedance data. Other graphs are plotted using raw data.
2. **Frequency Responses**: Variation in acoustic output level with frequency for a constant input signal. Processed: normalized to 0 dB SPL. Unprocessed inputs: 2 V (4 ohm nominal impedance), 2.83 V (8 ohm nominal impedance), or 4 V (16 ohm nominal impedance) referenced to a distance of 1 m.
3. **Processor Response**: The variation in output level with frequency for a constant input signal of 0.775 V = 0 dB reference.
4. **Beamwidth**: Average angle for each 1/3 octave frequency band where, starting from the rear of the loudspeaker, the output first reaches -6 dB SPL referenced to 0 dB SPL as the highest level. This method means the output may drop below -6 dB SPL within the beamwidth angle.
5. **Impedance**: Variation in impedance magnitude, in ohms, with frequency without regard to voltage/current phase. This means the impedance values may not be used to calculate True Watts (see 9 above).
6. **Polar Data**: Horizontal and vertical polar responses for each 1/3 octave frequency band 100 Hz to 16 kHz or Operating Range.

GestFX™ Ground /GestFX™ Wall







GestFX is an engaging gesture-control display system that projects dynamic interactive effects, games or advertisements onto floors, walls and even counters and bar tops. The system tracks and responds to gestures, allowing users to control multimedia content by moving their hands, feet or bodies.

Components

Hardware Unit	Metal projector/computer bay to mount various hardware components. Components can optionally be mounted on a threaded pole (not provided) or attached via a mount directly to the ceiling if the height is appropriate.		
	Size Weight	32” L x 23” W x 22.5” H (Note: Larger mount also available.) 45 lbs (approx.) without components mounted	
	Electrical	PC Projector IR Pucks x4 Note: If a Sanyo XF series projector is being used, there has to be a second, separate power circuit for the projector.	400w 490w – 499w 48w 938w – 947w Total (8.5 – 8.6a @ 110v) (4.0 – 4.1a @ 230v) 1700w (15.4 @ 110v)
Display	Content can be projected onto floors or walls. Ideally, the display surface should have a matte finish, which diffuses light more evenly over a wider angle of view. A light grey color is optimal, as it absorbs ambient light better than white, increasing the contrast range of the image. Size: Maximum 8’ x 6’ is recommended for a single-camera solution. Larger edge-blended displays are possible with a multiple-camera setup.		
Minimum Computing System Requirements	CPU	2.66 GHz Quad core processor	
	RAM	4G DDR2 800 (2GB x2)	
	Storage	120GB 3.5" SATAII HDD	
	Graphics	NVidia GeForce GTS 240	
	FireWire Card	1394 Texas Instruments	
	Power Supply	500W Input: 100–240V AC	

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Phone 416.340.9290 | Toll-free 800.315.1189 | Fax 416.640.9809 | www.gesturetek.com

GestureTek®

GestFX™ Ground /GestFX™ Wall

Components		
Camera	Type	Black & White FireWire
	Lens	3 - 8mm Varifocal Lens
	Filter	Slip-on IR Filter
	Frame Rate	60 fps
	Resolution	640 x 480
	Camera Mount	3” Multi-Axis
Projector (sold separately)	Brightness (in Lumens)	6,500 (XP 100) or 7,000 (XP 200)
	Contrast Ratio	600:1
	Aspect Ratio	4:3
	Resolution	1024 x 768

Software	• GestureTek patented tracking technology, featuring:
	  • Networking capability
	  • Multiple camera/PC capability
	• GestureTek Dazzler interactive media player
	• Windows® 7 operating system	

Accessories	Keyboard and mouse	
Environmental Considerations	Due to sensitivity to IR, avoid setup in sunlit areas or where there is intense overhead lighting. An IR Meter will be provided upon request.	
Shipping	We ship worldwide through various vendors.	
Warranty	One year on parts; 90 days on software; void if user provides components	
The technology used in GestFX is protected by several patents internationally including: 5,534,917 and 7,227,526.		

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Consumer Electronics Solutions

Gesture Control Solutions for Consumer Devices

Webcam-Based Hand, Face and Body Tracking Solutions

GestureTek's pioneering gesture control technology introduces a whole new level of interactivity for motion-controlled display systems. Whether it's a personal computer, laptop, set-top box, television set, mobile device, game console, digital sign or interactive kiosk, GestureTek's ground-breaking depth-tracking software lets users control devices using simple hand motions instead of a remote control, keyboard or other touch-based peripheral.

Lifelike 3D Virtual Reality Experiences

Our patented gesture recognition software tracks full-body movement or subtle hand gestures in complete 3D space. Using depth-sensing cameras to measure ongoing changes in position and distance between different parts of a user's image and other elements in the scene, the system reliably and repeatedly isolates and tracks a user's unique movements and then translates those gestures into specific computer commands. The system is resistant to environmental distractions such as background movement or variable lighting. Users can literally watch their real-time full-body video image, or their full-body 3D avatar, while they interact dynamically with computer-generated characters, objects and icons in a three-dimensional virtual world.

Full-Body Avatar Control

Gestural Platform Interface for any Device

GestureTek is leading the way to a fully gestural touch-free user interface for all camera-enabled consumer devices. Consumer electronics companies worldwide are turning to GestureTek's video gesture analysis technology to deliver computer control using a combination of hand poses and gestures, including hand waves, swipes and pointing. Leading TV and set-top box manufacturers are also using our technology to demonstrate their touch-free, remote-free devices.

GestureTek has a robust library of video gesture control patents and video capture, analysis and control commands available for license. APIs include full-body analysis and motion tracking, as well as feature-specific tracking such as face, hand, color, motion and object tracking.

Exciting Applications for Gesture-Based Interactive Experiences

GestureTek's trailblazing, patented depth-tracking technology has unlimited applications in countless sectors. Here are just a few of our successes:

- Entertainment solutions deployed in millions of consumer electronics devices, including phones and toys.
- An interactive attraction for the Beijing Olympics that features a hand-tracking interface to power a 3D flight simulation experience.
- Interactive and immersive advertising and digital signage solutions for companies such as Samsung, Hudson's Bay Company, Telefonica, Dublin Mall and Musgo.
- Virtual rehabilitation systems for healthcare organizations worldwide, where patients can watch themselves on-screen as they complete therapeutic exercises.

3D Flight Simulation Experience
at the Beijing Olympics

Two-Handed Gesture Control:
Drive with your Hands in Free Space

Selected Licensees

EYETOY™ XBOX 360 NTT DoCoMo Hasbro

GestureTek technologies have international patent protection. U.S. patents include: 5,534,917 (Video Gesture Control); 7,058,204 (Multiple Camera Control System/Point to Control); 7,421,093 (Multiple Camera Tracking for Interfacing With Application); 7,227,526 (Stereo Camera Control/3D-Vision Image Control); 7,379,563 (Two Handed Movement Tracker); 7,379,566 (Optical Flow-Based Tilt Sensor); 7,389,591 (Phone Tilt for Typing & Menus); 7,430,312 (Five Camera 3D Face Capture)

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GestPoint Maestro3D

A White Paper from GestureTek
The Inventor of 3D Video Gesture Control

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Executive Summary

GestureTek is the inventor, pioneer, and multi-patent holder for video gesture control, and 3D depth camera video gesture control. Over 25 years of product development and deployment in a vast array of real world environments has led to a robust and rich product suite. Strong international patents and technology has allowed GestureTek to license technologies and patents to major players like Microsoft for the XBOX, Sony for the PlayStation and Hasbro for toys.

GestPoint Maestro3D is GestureTek's patented computer vision software that works with 3D cameras to generate instantaneous tracking and gesture recognition. The Maestro3D SDK includes a depth camera, along with demos (including source code) that illustrate how the 3D position and gesture data generated by Maestro3D can be used to control applications in Flash and C++. Unlike other 3D computer vision software that requires an initialization process to map a skeletal frame onto the user, Maestro provides instantaneous tracking data that offers a real advantage when immediate responsiveness is required.

The 3D data is exposed through two different trackers that comprise the package. Maestro3D Hand tracks hands within a "volume of interest" (VOI), which allows the user to engage or disengage with the Tracker. The user places their hand within the VOI when tracking is required and removes it when they wish to use their hands for non-tracking purposes. Maestro3D Multi also uses a VOI, but it's generally set to be the same as the camera's field of view (FOV) to provide continuous tracking and gesture recognition, unless it is necessary to exclude elements within the FOV.

The Trackers

GestureTek's GestPoint Maestro3D SDK provides the tools necessary to create innovative, interactive, "Kinect™-like" experiences that enable users to control applications or other devices without a keyboard or mouse or the need to wear special equipment. Two trackers are provided:

GestPoint Maestro3D Hand Tracker

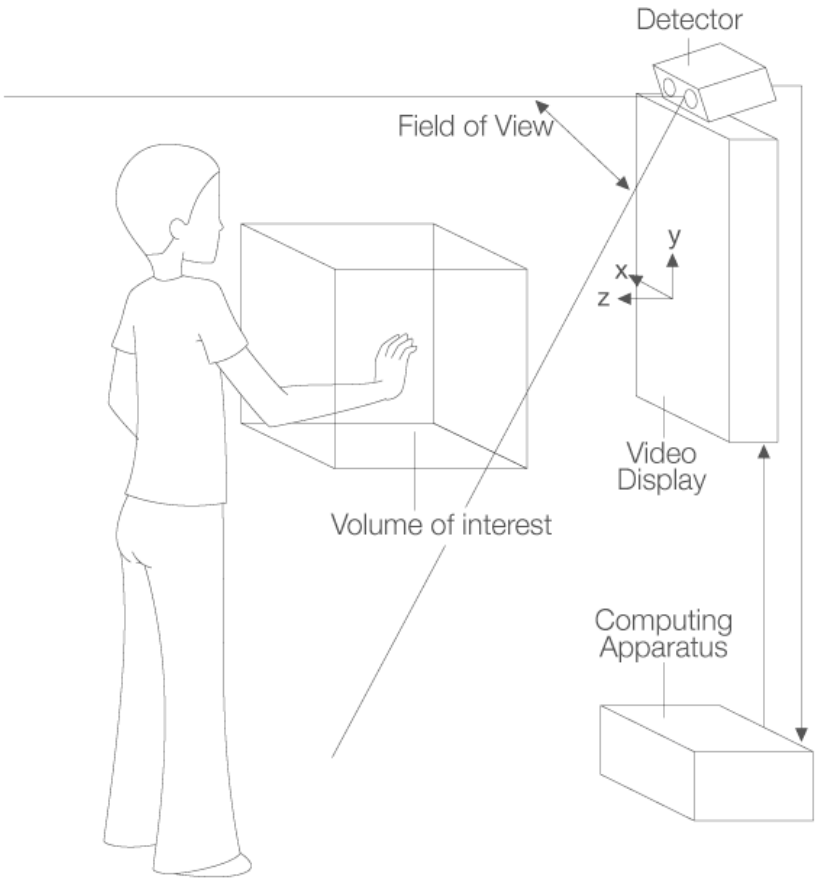

Figure 1. GestPoint Maestro3D Hand Tracker

The GestPoint Maestro3D Hand Tracker tracks hands within a "volume of interest" (VOI), which allows the user to engage or disengage the Tracker. The user places their hand within the VOI when tracking is required and removes it when they wish to use their hands for non-tracking purposes. By default the Hand Tracker provides mouse emulation for one hand, but tracking of up to ten hands is available through the API. The Tracker provides the 3D coordinates of hands within the camera's VOI with the camera's position as the origin. It also provides a unique ID for each hand tracked.

GestPoint Maestro3D Multi-Tracker

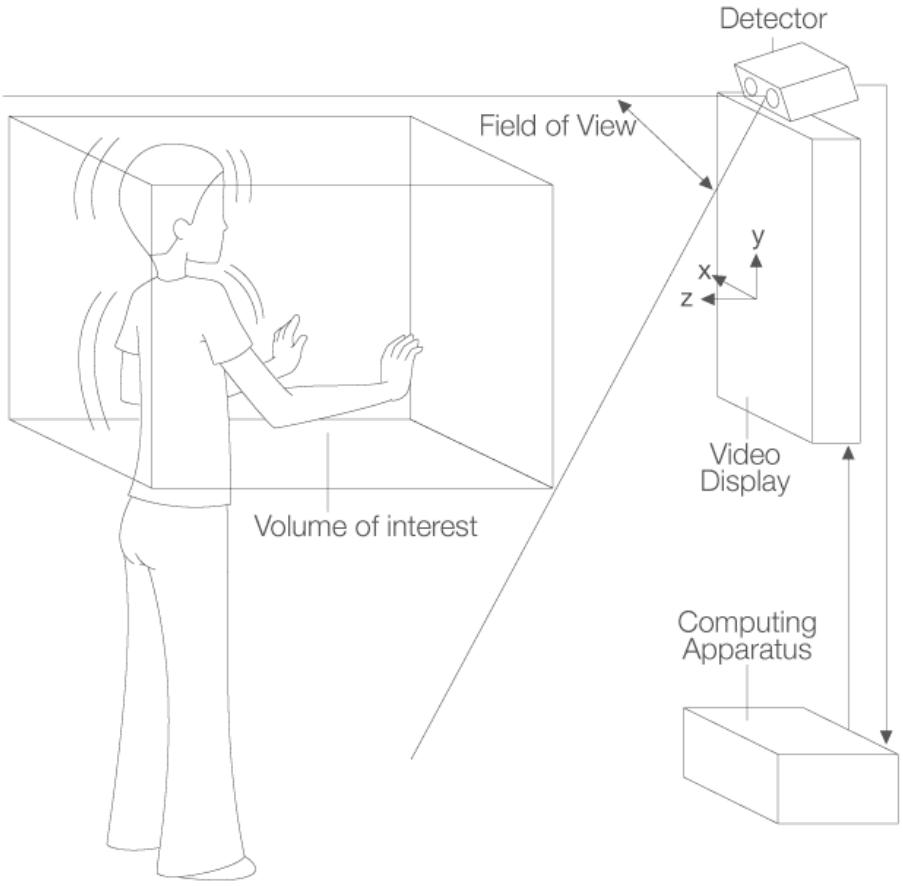

Figure 2. GestPoint Maestro3D Multi-Tracker

The GestPoint Maestro3D Multi-Tracker is a combination of five gestures and three trackers as described in the tables below.

Gestures

Gesture	How to Perform the Gesture
Circle Engagement	Move the hand in a continuous circular motion, either clockwise or counter-clockwise, such that the circle begins and ends at approximately the same point. Once one complete circle has been detected, continuous control along the circumference of the circle is enabled.
Swipe	Move the hand (with the fingers together and palm to the side) horizontally from right to left or left to right.
Poke	Move the hand quickly forward towards the camera.
Scaling/Rotating	Hold two hands up and move the closer or farther apart (for scaling) or move them in a clockwise or counterclockwise motion (for rotation).
Steering	Hold two hands up in a typical 10:00 and 2:00 steering position and move them together either clockwise or counterclockwise.
Palm Open	Extend the hand towards the camera with the palm facing the camera and fingers spread apart.

Trackers

Tracker	Purpose
Depth Segmentation	Detects the body-sized object (torso) that is closest to the camera and provides the torso's depth position. A single crosshairs indicates that an object has been detected. When the detected object is lost, the crosshairs change color.
Two Hand Tracker	Detects and tracks hands when they are closer to the camera than the body, and the head and half of the torso are also visible. The hands must be at least 180 mm in front of the body to be detected.
Four Point Tracker	Tracks (head, torso, and hands). Hands are tracked in any position relative to the rest of the body. However, when they are directly in front of the body, they must be at least 180 mm from the body.

Applications

The success of Kinect has popularized device-free control. Gaming is an obvious application but there are plenty of other applications where the functionality of Maestro3D can be leveraged. Here are a few:

Home automation – Control devices around your home using gestures; for example, operating the television from the living room couch.

Gaming – Avatar control and/or replacement of hardware control devices with simple hand / body gestures

Clean room – Touch-free control of peripheral equipment in sterile environments such as clean rooms and surgical theatres

Boardroom – Control presentations in the board room without devices.

Digital signage – Touch-free, engaging interactive digital signage displays

PC desktop – Control your PC hands-free, such as answering Skype calls or controlling media playback.

Video conferencing – Control presentations and ensuing discussion during a conference call, using gestures.

In car control – Hands-free interaction with car controls such as navigation, communication, entertainment and internal environment.

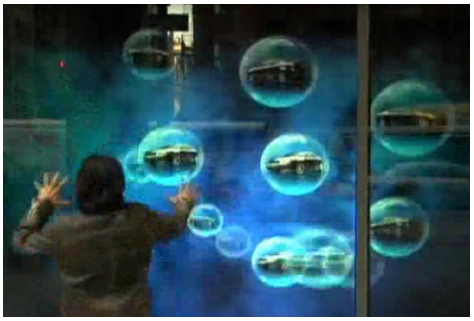

Figure 3. Digital Signage

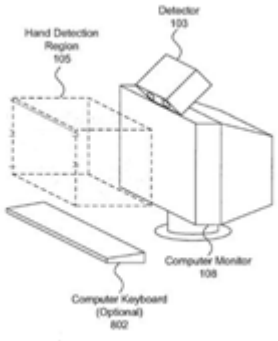

Figure 4. Near Screen Control

Figure 5. Surgery / Clean Room

Market

The instantaneous 3D tracking data provided by GestPoint Maestro3D makes it unique in the 3D computer vision market. It's suitable for integration with applications that require touch-free control, so it applies to numerous markets including digital signage, gaming, home/office/laboratory automation, automotive control and telecommunications.

Conclusion

GestPoint Maestro3D exposes two different trackers that offer 3D tracking and gesture recognition for numerous 3D cameras available in the market today. Unlike other 3D computer vision software that requires an initialization process to map a skeletal frame onto the user, Maestro provides instantaneous tracking data that offers a real advantage when immediate responsiveness is required. Maestro3D provides 2D mouse control "out-of-the-box" and offers an SDK that provides developers with access to 3D data and gestures that can be used to control applications written in Flash and C/C++.

About GestureTek

GestureTek®, founded in 1986, is the inventor, pioneer and world leader in gesture recognition technologies for presentation, information and entertainment systems. With patented single camera, multiple camera and 3D-vision solutions, GestureTek's video gesture control technology lets people use hand and body motions to control dynamic computer content on any screen, surface or camera-enabled device – with no need to wear, hold or touch anything. We also offer immersive and multi-touch interactive solutions. GestPoint Maestro3D is covered by one or more of the following US patents and their associated international filings:

US Patent 5,534,917	US Patent 7,389,591	US Patent 7,570,805	US Patent 7,848,542
US Patent 7,058,204	US Patent 7,421,093	US Patent 7,777,899	US Patent 7,898,522
US Patent 7,227,526	US Patent 7,430,312	US Patent 7,822,267	
US Patent 7,379,563	US Patent 7,574,020	US Patent 7,827,698	
US Patent 7,379,566	US Patent 7,555,142	US Patent 7,853,041	

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