City of Glendale

BUILDING STANDARDS

Issued
February 3, 2005

CITY OF GLENDALE - BUILDING STANDARDS

INTRODUCTORY STATEMENTS

0.1 PURPOSE OF BUILDING STANDARDS

0.11 Building Standards Committee

The Building Standards Committee was created by the City Manager to provide a unified approach to planning for construction of new buildings and tenant improvements of existing buildings owned or occupied by The City of Glendale. The committees' oversight includes new construction, tenant improvements (T.I.) or modifications of existing city facilities, planning for parks and public amenities such as fountains, trails, etc.

The Building Standards Committee will review projects during the design phase when developed to the appropriate level of detail to ensure compliance with the City of Glendale standards while maintaining economy of construction, operation and maintenance.

Because all building systems are integrated, a change in one component can result in sub-optimal operation and performance among other components. The Building Standards Committee would consider how all building systems are affected, as well as, focus on specific issues (i.e. office size or modular work stations, interior and exterior finishes, roof type, floor covering, energy conservation, handicapped accessibility and security). A broad-based review would encourage the following:

- Improved environmental conditions and occupant comfort
- Improved energy efficiency and savings
- Improved water efficiency and savings
- Improved function of building systems
- Improved building operation and maintenance
- Improved building productivity

To maximize coordination during the design process, the committee is made up of representatives from Building Safety, Engineering, Facilities Management, Environmental Resources, Information Technology, Traffic Engineering, Police, Fire & Recreation.

Procedures for the completion of improvements to city facilities shall be as outlined in the City Managers Directive No. 17.

0.12 Building Standards

The City of Glendale has adopted "The City of Glendale – Building Standards" in order to facilitate the design, procurement and maintenance of Glendale public buildings by providing detailed technical specifications for building components, detailed design guidelines for certain systems and mandatory requirements for procurement. These standards are also intended to maintain design criteria reflecting sustainability, energy efficiency, quality of design and economy of operation and maintenance for City facilities.

The City of Glendale – Building Standards are a "work-in progress" subject to updates, revisions, additions and deletions. Therefore, the provisions of this document are not intended to prohibit the use of

alternative systems, methods, or devices not specifically prescribed by this document, provided the Building Standards Committee has approved such alternatives. The alternative systems, methods, or devices shall be submitted along with adequate technical documentation to demonstrate that the proposed alternative design is at least equivalent or superior to the prescribed requirements. It is expected that short term and long term cost benefits will be realized because of standardization and improved quality of projects and that the use of these standards will be beneficial to project development without restricting the creativity of the design professional.

All development within the City of Glendale shall comply with all requirements of the City of Glendale Code and Ordinances, and the laws and regulations of such other agencies as may have jurisdiction. Preliminary and final design plans shall be prepared in accordance with these standards unless specific variances have been approved by the City. Standards for infrastructure construction within the City shall comply with the current edition of the Engineering Design and Construction Standards Manual.

0.13 Project Manager

Each City of Glendale construction/renovation project has a “project manager”. This is usually, but not always, an employee of the city’s Engineering Department. This person is responsible for coordinating and managing the project. The project manager shall be responsible for scheduling and presenting projects before the Building Standards Committee. Based on the complexity of the project, project presentations are to be scheduled at 30% and 60% completion of the design phase. Any questions should be directed to this project manager.

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BUILDING STANDARDS REQUIREMENTS

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

00 00 00 Procurement and Contracting Requirements

01 Construction contract drawings shall be prepared on 24 inch by 36 inch sheets.

00 10 00 Solicitation

01 Refer to documents listed under Procurement Forms and Supplements, Section 00 40 00.

00 20 00 Instructions for Procurement

01 Refer to documents listed under Procurement Forms and Supplements, Section 00 40 00.

00 30 00 Available Information – Not used

00 40 00 Procurement Forms and Supplements

01 Standard bidding and contract documents will be furnished by the City of Glendale Engineering Department for use in the Project. Copies of the standard documents are attached for reference, and include the following documents:

a. Cover sheet
b. Notice to Contractors (Advertisement)
c. Information for Bidders
d. Proposal Form
e. Subcontractor Listing and Certification of Contract Compliance
f. Statutory Bid Bond
g. Contract
h. Statutory Performance Bond
i. Statutory Payment Bond
j. Engineering Department Certificate of Insurance
k. Contractor's Affidavit Regarding Settlement of Claims
l. Supplemental General Conditions
m. Special Provisions

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00 50 00 Contracting Forms and Supplements – Not used

00 60 00 Project Forms – Not used

00 70 00 Conditions of the Contract

00 71 00 Contracting Definitions

00 72 00 General Conditions of the Contract

01 "Uniform Standard Specifications for Public Works Construction" as published by Maricopa Association of Governments as adopted by Ordinance No. 1110 New

Series, of the City of Glendale is the standard General Conditions of the Contract.

00 73 00 Supplementary Conditions

01 Refer to documents listed under Procurement Forms and Supplements, Section 00 40 00.

00 79 00 Design Requirements

01 All work shall meet the requirements of the currently adopted building, fire, electrical, plumbing and mechanical codes and any amendments. All projects require city plan review, city permits and city inspections prior to occupancy.

00 79 13 Accessibility Guidelines

01 Buildings and facilities shall be designed to comply with requirements of the Arizonans with Disabilities Act Accessibility Guidelines (ADAAG), Arizonans with Disabilities Act, (ARS Section 41-1492.03) and the Act's implementing rules (R 10-3-403 and R 10-3-404 including 28 CFR Part 35 and 28 CFR 36) and regulations and ordinances of the City of Glendale, including the following.

02 Parking

a. Design of designated accessible parking spaces shall be in compliance with the ADAAG and local zoning codes.
b. Provide accessible route from the accessible parking to an accessible entrance.
c. When parking is adjacent to a sidewalk, provide transition (curb cut) between the access aisle and the sidewalk.
d. Provide car and van accessible parking spaces in parking areas.
e. Signage shall be in compliance with local parking enforcement requirements.
f. The slope of the designated accessible parking space and access aisle shall not exceed 2% in any direction.
g. Access aisles shall be designed to permit backing into the parking space.

03 Accessible Route - Exterior

a. Provide accessible pedestrian routes on a site from public transportation stops, accessible parking spaces, passenger loading zones and public streets and sidewalks to accessible entrances.
b. Pedestrian routes shall not have a cross-slope exceeding 2%.

04 Curb Ramps

a. Curb cuts shall be aligned with access aisles.
b. Built-up curb ramp shall not project into the access aisle.
c. Curb cuts shall be arranged so as to not be obstructed by parked vehicles.
d. Curb ramp that is located across a circulation path shall not have unprotected side flares exceeding 1:12 (8.33%.)
f. Returned curbs shall not be used where pedestrian traffic crosses the ramp.

05 Ramps
- a. Landing areas where ramps change direction (e.g., switchbacks or 90%) shall comply with ADAAG.
- b. Ramp shall be provided where the height of the curb exceeds 6” or the length exceeds 72”.
- c. Parts of an accessible route with slopes that exceed 1:20 shall include required features such as handrails and edge protection.
- d. Accessible handrails shall comply with ADAAG.

06 Stairs
- a. Provide handrail extensions at the top and bottom risers in accordance with ADAAG.

07 Circulation Paths
- a. Objects shall not protrude into circulation paths from the side or from posts.

08 Doors
- a. Provide maneuvering clearance at Doors, including doors to accessible toilet stalls in accordance with ADAAG.
- b. Hardware shape and operation shall comply with ADAAG.
- c. Provide accessible thresholds at doors.
- d. Clear door width shall not be less than 32 inches.

09 Drinking Fountains
- a. All drinking fountains shall be mounted in accordance with ADAAG, including fountains for individuals unable to bend over.

10 Restaurants
- a. Food service queuing areas shall be of adequate width and provide clear width for turns.
- a. Condiment or utensil items shall be placed within required reach range located on an accessible route.

11 Toilet Rooms and Bathrooms
- a. Where toilet rooms or bathrooms are provided, all Public and common use toilet rooms and bathrooms (including locker rooms and toilet rooms for employee use) shall be accessible.
- b. Toilet rooms with 6 or more toilet stalls shall include a 36” wide “ambulatory” toilet stall.
- c. Door to the toilet rooms shall not swing into the required clear floor space at accessible fixtures, controls, and dispensers.

12 Signage
- a. Where permanent room identification signage is provided, It shall be mounted in accordance with ADAAG.

12 Visual Alarms
- a. Visual alarms shall be provided in addition to an audible alarm system.

13 Transient lodging
- a. In hotels, motels, or other lodging facilities of 50 or more sleeping rooms, rooms with roll-in showers shall be provided and shall include a fold-down seat.

b. Wheelchair accessible rooms shall be equipped with visual alarms and notification devices.
c. Doors into and within guest rooms shall be accessible.
d. Guest rooms shall provide at least 32” clear opening width.
e. Water closets shall be installed centered exactly 18 inches off the side wall.

00 79 13 Crime Prevention Through Environmental Design

01 The Project may require design meeting standards of Crime Prevention Through Environmental Design (CPTED) as listed below. Many of the requirements are general in nature. As more specific details concerning the project are provided more specific requirements may be presented.

CPTED relies on five basic principles to enhance both safety and security. The five principals are natural surveillance, access control, territoriality, activity support, and maintenance.

Natural surveillance is a design concept directed primarily at keeping intruders under observation. Provisions of natural surveillance help to create environments that maximize the opportunities for people engaged in their normal activities to observe the space around them. The orientation of buildings, locations of windows, buildings entries, refuse containers, and related work activities all contribute to the maximum utilization of natural surveillance.

Access control limits public access to restricted areas while attempting to increase the opportunities for natural surveillance. The principle also attempts to control private entrance to restricted areas to those with a need to enter the area.

Territoriality is a principle that when correctly used clearly delineates private space from semi-private and public spaces. Thereby creating a sense of ownership for those people most responsible for the area. Territoriality creates an environment that makes the criminal element feel uncomfortable within the area.

Activity support involves the placement of activities where the individuals engaged in the activities would become part of the natural surveillance system. A basic component of activity support is the placement of employee work areas so a visual corridor exists between the areas. This allows one employee to support another.

Maintenance includes the proper selection and placement of high maintenance items such as landscaping, lighting, and other features to facilitate the principles of CPTED. For example, the proper selection of landscape plants can reduce maintenance concerns related to safety and security.

02 Based upon the CPTED principles the following requirements must be adhered to during the planning phase of this project.
a. Design Concept Conditions:
1) The building shall be designed using the above-indicated CPTED principles.
2) Public access locations shall be clearly identified and controlled.

3) Public restrooms must be accessed from within the lobby area only.
4) Reception areas shall be designed with unobstructed views of public access locations and approaches.
5) Reception areas shall be designed in such a way as to enhance activity support. This can be accomplished using adjoining workstations and / or the installation of window walls.
6) The reception area shall be separated from public access areas by counter wall that can be closed off from the public. A control access door shall be used to control access from the public area to the semi-public and private areas.
7) Private or employee restroom entries must be directly visible from employee work or break areas. No recessed or isolated multi-user restroom entries permitted.
8) Break rooms be designed to maximize natural surveillance. Window walls and window doors should be utilized.
9) A minimum of two panic alarms shall be installed in the reception area.
10) Avenues of escape shall be provided so reception area employees have clear emergency egress routes.
11) Closed circuit television shall be used to monitor the lobby / reception area. Two monitoring locations shall be established. One monitoring location shall be at the fire station and the other at city hall.
12) No lower windows separated by mullions shall be permitted on the side and rear elevations of the building or concealed by landscaping.
13) Screening walls shall be a minimum of eight feet (8') tall to allow them to also serve as security walls.
14) Access control fences shall be ornamental or wrought iron and must be a minimum of six feet (6') tall.
15) Access control gates shall have card access.
16) All employee services doors shall have a 6" x 6" laminated glass or lexan security window center mounted on the door. The security window shall be mounted 63" from the center of the glazing to the bottom edge of the door.

b. Access Control:
1) See related controlled access conditions from above.
2) Employee access locations shall be controlled using card access.
3) Single user restrooms shall have ADA approved privacy locks.
4) Wide-angle viewers (180 degree) required on any individual living quarter room doors.
5) A latch guard shall be installed on all building entry doors. An exception is made for storefront type doors and those doors with push-bar panic hardware.
6) The building shall be designed with secured parking and fire equipment staging areas. Such areas must be visible from work and living areas within the building.

c. Security Lighting Conditions:
   1) See related lighting conditions from above.
   2) Public and employee parking areas must be illuminated with a minimum of two (2.0) foot-candles of light, measured at grade, from dusk to dawn.
   3) All building entry areas shall be illuminated with a minimum of five (5.0) foot-candles of light, measured at grade, form dusk to dawn.
   4) Provide security lighting details and point by point photometics (10' centers) overlaid on a 50% screened landscape plan. Metal halide security lighting is required. A .68 light loss factor shall be used to calculate photometrics.
   5) All exterior lighting fixtures shall be of a full cutoff design and have vandal resistant and weatherproof covers. Lights must conform to Glendale Outdoor Lighting Ordinance. Lighting cut-sheets must be submitted and approved for all exterior light fixtures.
   6) Multi-user restrooms must have a minimum of one light on a 24-hour circuit.
   7) Break rooms must have a minimum of one light on a 24-hour circuit.

d. Landscaping Conditions:
   1) Landscaping materials such as trees shall not interfere with security lighting at full maturity. Security lights are not permitted in landscape parking islands. No trees shall be planted within a 20' radius of any security light.
   2) No river rocks or similar materials are permitted unless2/3 of each stone is embedded in concrete.
   3) Shrubbery shall comply with the following height restrictions at maturity. Shrubbery planted within six feet (6') of sidewalks, parking areas, driveways, and building entrances shall be of a type that will not grow taller than two feet (2') tall at maturity. Shrubbery planted between (6') and twelve feet (12') of the indicated areas shall not grow taller than three feet (3') tall at maturity. Barrier plants (those with thorns) and plants that can typically be seen through may be approved within the restricted height area.

e. Addressing Conditions:
   1) Twelve-inch (12') tall street address numbers are required on each of the four primary elevations of this building. Additional numbers maybe required for building elevations over one hundred feet (100') in length.
   2) Each address number must have a minimum of a seventy percent (70%) color contrast with its background.
   3) All address numbers must be lit from dusk to dawn using either back or down lightning.

BID DOCUMENTS

PROJECT

CITY OF GLENDALE
ENGINEERING DEPARTMENT

NOTICE TO CONTRACTORS

Sealed bids shall be either mailed to the City of Glendale Engineering Department, 5850 West Glendale Avenue, Glendale, Arizona, 85301, or hand-delivered to the Engineering Department office, third floor, 5850 West Glendale Avenue, Glendale, Arizona, for furnishing all plant, material, equipment and labor, and to complete construction of: **PROJECT NO. - .**

Bids must be received by the Engineering Department of the City of Glendale no later than , . Any bid received after that time will not be considered and will be returned to the bidder. At that time, the bids will be publicly opened and read aloud in the Engineering Department Conference Room, 5850 West Glendale Avenue, Glendale, Arizona.

Plans, specifications and contract documents may be examined, and copies may be obtained at City of Glendale Engineering Department, 5850 West Glendale Avenue, Glendale, Arizona. A non-refundable charge of shall be paid for each set of plans and specifications issued from this office.

Each bid shall be in accordance with the plans, specifications and contract documents, and shall be set forth and submitted on the BID DOCUMENTS included with the project specifications book. The BID DOCUMENTS may be removed from the project specifications book and submitted independently of such book. Each bid shall be accompanied by a proposal guarantee, in the form of a certified or cashier's check or bid bond for ten percent (10%) of the amount of bid, made payable to the order of the City of Glendale, Arizona, to insure that the successful bidder will enter into the contract if awarded to him and submit the required Certificate of Insurance, Payment Bond and Performance Bond. All proposal guarantees, except those of the three lowest qualified bidders, will be returned immediately following the opening and checking of proposals. The proposal guarantees of the three lowest qualified bidders will be returned immediately after the contract documents have been executed by the successful bidder. The proposal guarantee shall be declared forfeited as liquidated damages if the successful bidder refuses to enter into said contract or submit the Certificate of Insurance, Payment Bond and Performance Bond after being requested to do so by the City of Glendale, Arizona.

The City of Glendale reserves the right to reject any or all bids or waive any informality in a bid. No bidder may withdraw his bid for a period of fifty (50) days after opening and reading of the bids.

The City of Glendale is an equal opportunity employer and minority business enterprises and women's business enterprises are encouraged to submit bids.

CITY OF GLENDALE, ARIZONA

By: Ed Beasley, City Manager

Published:
The Glendale Star

INFORMATION FOR BIDDERS

1. ELIGIBILITY OF CONTRACTORS: When calling for bids for contracts for public work to be performed on behalf of the State or any political subdivision thereof, which will be paid for from public funds, no bid shall be considered for performance of a contract, including construction work which is not submitted by a bidder duly licensed as a contractor in this State.

2. PROPOSAL: Bids to receive consideration shall be made in accordance with the following instructions:

(a) Before submitting a bid, bidders shall carefully examine the plans and specifications and contract documents, visit the site of the work, fully inform themselves as to all existing conditions and limitations.

(b) Bids shall be submitted on the "PROPOSAL" forms provided and delivered to the City of Glendale Engineering Department on or before the day and hour set in the "NOTICE TO CONTRACTORS," as published. Bids shall be enclosed in a sealed envelope marked on the outside lower right-hand corner indicating:

1. The bidder's name and address.
2. The project number.
3. The title of the project.
4. The time and date the bids are to be received.

(c) It is the sole responsibility of the bidder to see that his bid is received in proper time. Any bids received after the scheduled closing time for receipt of bids will be returned to the bidder unopened.

(d) The signatures of all persons shall be in longhand. Any interlineations, alterations, or erasures must be initialed by the signer of the bid.

(e) Bids shall not contain any recapitulations of the work to be done. No oral, telegraphic, telephonic, or modified proposals will be considered.

3. BID SECURITY: Each proposal shall be accompanied by a certified or cashier's check or bid bond, with a properly executed Power of Attorney attached, in an amount equal at least to ten percent (10%) of the proposal payable without condition to the City. The proposal guarantee shall guarantee that the bidder, if awarded the contract, will, within ten (10) working days after the award, execute such contract in accordance with the proposal and in manner and form required by the contract documents, and will furnish good and sufficient bond for the faithful performance of the same, a payment bond and a certificate of insurance. The bid securities of the three (3) lowest bidders will be retained until the contract is awarded, or other disposition made thereof. The bid securities of all bidders, except the three (3) lowest, will be returned promptly after the canvass of bids. In the event the Contractor fails, within ten (10) working days after the award, to execute said Contract and deliver the Performance and Labor and Material Payment Bonds and the Certificate of Insurance, the Bid Security shall become the property of the City.

4. WITHDRAWAL OF BID: Any bidder may withdraw his bid, either personally, by telegraph or by written request, at any time prior to the scheduled closing time for receipt of bids. No bid may be withdrawn by telephone. Any bid withdrawn will not be opened and will be returned to the bidder. After opening and reading of the bids, no bidder may withdraw his bid for a period of fifty (50) days from the date of opening and reading.

5. LATE BIDS: Bids received after the scheduled closing time for receipt of bids, as contained in the "Notice to Contractors," will not be considered and will be returned to the bidder.

6. AWARD OR REJECTION OF BIDS: The contract will be awarded to the lowest and best qualified responsive bidder complying with these instructions and with the "NOTICE TO CONTRACTORS." The City of Glendale, Arizona, however, reserves the right to accept or reject any or all bids or to waive any or all informalities or irregularities in the bid. Alternates may be accepted depending upon the availability of City funds. Accepted alternates will be considered in determining the lowest responsive and responsible bidder.

7. BIDDERS INTERESTED IN MORE THAN ONE BID: No person, firm or corporation shall be allowed to make, file, or be interested in more than one (1) bid for the same work unless alternate bids are called for in the specifications or any addenda. A person, firm, or corporation who has submitted a sub-proposal to a bidder, or who has quoted prices on materials to a bidder is not thereby disqualified from submitting a sub-proposal or quoting prices to other bidders.

8. CONTRACT, BONDS AND INSURANCE: The form of contract, which the successful bidder as Contractor will be required to execute, and the forms of bonds and insurance form which he will be required to furnish are included in the contract documents and should be carefully examined by the bidder. The successful bidder shall use the forms provided or such other forms as are acceptable by the City. The contract, bonds and insurance form will be executed in () original counterparts. "All bonds shall be issued by companies licensed with the Arizona Department of Insurance and authorized to issue such bonds in this state. **NO BONDS ISSUED BY INDIVIDUAL SURETIES WILL BE ACCEPTED.** The company issuing any bond shall have a rating of not less than **A-** in the BEST rating available at the time this project was let to bid."

9. INTERPRETATION OF PLANS AND DOCUMENTS: If any person contemplating a bid for proposed contract is in doubt as to the true meaning of any part of the plans, specifications, or other proposed contract documents, or finds discrepancies in or omissions from the plans and specifications, he may submit to the Engineering Department, a written request for an interpretation or correction thereof. The person submitting the request will be responsible for its prompt delivery. Questions received less than ninety-six (96) hours before the bid opening time may not be answered. Any interpretation or correction of the documents will be made only by Addendum, duly issued and a copy of such Addendum will be mailed or delivered to each person receiving a set of such documents. The City of Glendale will not be responsible for any other explanations or interpretations of the proposed documents.

10. CHANGES TO PLANS AND DOCUMENTS: Any changes to the plans and documents shall be made only by Addendum. No verbal or other changes to the plans and documents will be valid. A copy of each Addendum will be mailed or delivered as provided in Section 11 below.

11. ADDENDUM: Any addenda will be faxed, mailed or delivered to all who are known by the City to have received a complete set of bid documents, and to offices where bid documents have been filed for review purposes. It is the responsibility of each bidder to ascertain that he has received all addenda issued by telephoning the office identified in the Notice to Contractors as the location where bid documents are available prior to submitting his bid.

Bidders shall acknowledge all addenda in the appropriate location on the "PROPOSAL" form. Failure to acknowledge receipt of Addenda shall render the bid proposal non-responsive and it will be rejected.

12. ASSIGNMENT OF CONTRACT: No assignment by the Contractor of any contract to be entered into hereunder, or any part thereof, or of funds to be received thereunder by the Contractor, will be recognized by the Owner unless such assignment has had prior approval of the Owner, and the Surety has been given due notice of such assignment in writing and has consented thereto in writing.

13. PLANS AND SPECIFICATIONS TO SUCCESSFUL BIDDER: The successful bidder may obtain five (5) sets of plans and specifications for this project from the City at no cost.

14. TIME OF COMPLETION: The Contractor shall commence work under this project on or before the tenth day following receipt of the notice to proceed for that project from the City of Glendale and shall fully complete all work under the project within () consecutive calendar days from and including the date of receipt of such notice to proceed. Time is of the essence in the completion of all work required under this contract. The Contractor shall, at all times, during the continuance of the contract, prosecute the work with such force and equipment as is sufficient to complete all work within the time specified.

15. CITY OF GLENDALE TRANSACTION PRIVILEGE TAX: The City of Glendale transaction privilege tax shall **NOT** be waived under the conditions of this contract. The current privilege tax rate can be obtained from the City of Glendale Sales Tax and Licenses Department. The Contractor shall be responsible for reporting and payment of all city, county, state or federal taxes.

16. PRE-BID CONFERENCE: A pre-bid conference will be held on , at , in the Engineering Department Conference Room, 5850 West Glendale Avenue, Glendale, Arizona. Bidders, contractors, and other interested parties are invited to attend this conference which will be conducted by the Owner and Engineer to answer any questions.

17. ALTERNATES: Alternate proposals will not be considered unless called for in the documents or any addenda thereto. When alternates are requested, all requested alternates or alternate bid items, unless otherwise stated, shall be bid. If no change in the base bid will occur with the alternate, enter "No Change."

18. APPROVAL OF SUBSTITUTIONS: The materials, products and equipment described in the Documents and Addenda establish a standard or required function, dimension, appearance and quality to be met by any proposed substitution. No substitute will be considered, before bid opening, unless written request for approval has been received by the City Engineer at least ten (10) working days prior to the scheduled closing time for receipt of bids. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute including any drawings, cuts, performance and test data and any other information necessary for evaluation of the substitute. Bidder shall not be entitled to approval of a substitute.

If a substitute is approved, the approval shall be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.

19. USE OF "EQUALS": When the specifications for materials, articles, products and equipment state "or equal," contractor may bid upon, and use materials, articles, products and equipment which will perform equally the duties imposed by the general design. The City Engineering Department will have the final approval of all materials, articles, products and equipment proposed to be used as an "equal." It shall not be purchased or installed without the prior written approval from the City Engineering Department.

Approvals for "equals," before bid opening, may be requested in writing to the City Engineering Department for approval. Requests must be received at least ten (10) days prior to the date set for opening the Bid Proposals. The request shall state the name of the material, article, product or equipment for which the item is sought to be considered an equal and a complete description of the proposed equal including any drawings, cuts, performance and test data and any other information necessary for approval of the equal. All approvals will be issued in the form of an addendum.

20. EXAMINATION OF CONTRACT DOCUMENTS AND VISIT SITE: Before submitting a Bid Proposal, bidders should carefully examine the Contract Documents, visit the site of the work, fully inform themselves as to all existing conditions and limitations. No consideration will be granted for any alleged misunderstanding of the material, articles or piece of equipment to be furnished or work to be done. It is understood that the tender of the Bid Proposal carries with it the agreement to all items and conditions referred to herein or indicated in the Contract Documents.

21. BIDDERS IN DEFAULT: No bid will be awarded to any person, firm or corporation that is in arrears or is in default to the City of Glendale upon any debt or contract, or that is a defaulter as surety or otherwise upon

any obligation to the City of Glendale, or has failed to faithfully perform any previous contract with the City of Glendale.

END OF INFORMATION FOR BIDDERS

PROPOSAL

Place _____
Date

Proposal of _____, a Corporation organized and existing under the laws of

the State of Arizona. a partnership consisting of _____; or an individual

trading as _____.

TO THE HONORABLE MAYOR AND COUNCIL
CITY OF GLENDALE
GLENDALE, ARIZONA

Gentlemen:

The undersigned hereby proposes and agrees to furnish any and all required labor, materials, construction equipment, transportation and services for the construction of: **PROJECT -** , in strict conformity with the plans and specifications for the following unit prices:

(Extension of these unit prices on the basis of estimated quantities and the totaling of these extensions are for the purpose of comparing bids only. The mathematics of such extensions and totaling will be checked and corrected by the Community Development/Engineering Department, before evaluating the bids, and the lowest of such corrected and checked totals will determine the lowest bids.)

Insert Bid Schedule

The undersigned hereby declares that he has visited the site(s) and has carefully examined the contract documents relating to the work covered by the above bid or bids.

Upon receipt of notice of the acceptance of this bid, we will execute the formal contract attached within ten (10) days, and will deliver a one hundred percent (100%) Performance Bond for the faithful performance of this Contract, together with a one hundred percent (100%) Payment Bond and Certificate of Insurance.

The bid security attached, with endorsement, in the sum of ten percent (10%) of the total bid, is to become the property of the City of Glendale, Arizona, in the event the Contract and Bonds are not executed within the time set forth, as liquidated damages for the delay and additional work caused thereby.

The undersigned has checked carefully all the above figures and understands that the City of Glendale, Arizona, will not be responsible for any errors or omissions on the part of the undersigned in making up this bid.

The undersigned understands that the Mayor and Council of the City of Glendale, Arizona, reserves the right to reject any or all bids or to waive any informalities in the bid.

Respectfully submitted,

Arizona Contractor's Classification and License No.

Contractor

By

_____

(Complete business address)
Telephone Number: _____
Fax Number _____

Bidder shall signify receipt of all Addenda here (if any):

_____

_____

Failure to acknowledge receipt of all Addenda shall render the bid proposal non-responsive and will be rejected.

Acknowledged by _____

CITY OF GLENDALE

Subcontractor Listing and Certification of Contract Compliance

PROJECT -

The undersigned contractor hereby submits the following list of firms to be employed as subcontractors on the above referenced project:

SUBCONTRACTOR	WORK ELEMENTS	DBE(Y/N)*	AGENCY**

The undersigned hereby certifies that all subcontracts shall be in writing and shall provide that all work to be performed shall be in accordance with the terms of the Contract. All subcontracts shall be subject to approval by the City. Certified copies of all subcontracts shall be furnished to the Engineer; however, prices may be omitted. Subcontracts shall conform to the regulations governing employment of labor.

_____
Name of Firm

DBE?(Y/N)*:_____ Agency**:_____

_____
Signature

_____
Title

*Firms certified as Disadvantaged Business Enterprises. **Indicate certifying agency, e.g., ADOT, MCHD, COP, etc. **This information is requested for information purposes only**. The City of Glendale is an equal opportunity employer and minority business enterprises and women's business enterprises are encouraged to submit bids.

STATUTORY BID BOND
PURSUANT TO TITLE 34, CHAPTER 2, ARTICLE 1
OF THE ARIZONA REVISED STATUTES
(Penalty of this bond must not be less than 10% of the bid amount)

KNOW ALL MEN BY THESE PRESENTS:

That we, _____
(hereinafter "Principal") as Principal, and _____
_____, (hereinafter called the Surety) a corporation organized and existing under the laws of the State of _____, with its principal offices in the City of _____, as Surety, are held and firmly bound unto the City of Glendale (hereinafter "Obligee") in the amount of Dollars ($_____) for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the said Principal has submitted a bid for: **PROJECT -**

NOW, THEREFORE, if the Obligee shall accept the proposal of the Principal and the Principal shall enter into a contract with the Obligee in accordance with the terms of the proposal and give the Bonds and Certificates of Insurance as specified in the Standard Specifications with good and sufficient Surety for the faithful performance of the Contract and for the prompt payment of labor and material furnished in the prosecution of the contract, or in the event of the failure of the Principal to enter into such contract and give the Bonds and Certificates of Insurance, if the Principal pays to the Obligee the difference not to exceed the penalty of the bond between the amount specified in the Proposal and such larger amount for which the Obligee may in good faith contract with another party to perform the work covered by the Proposal, then this obligation is void. Otherwise, it remains in full force and effect provided, however, that this bond is executed pursuant to the provisions of Section 34-201, Arizona Revised Statutes, and all liabilities on this bond shall be determined in accordance with the provisions of the section to the extent as if it were copied at length herein.

Witness our hands this ____ day of _____, 20__.

_____
PRINCIPAL SEAL

By: _____

SURETY SEAL

AGENCY OF RECORD

CONTRACT

THIS AGREEMENT, made and entered into this ____ day of_____, 20__, by and between the City of Glendale, Arizona, a municipal corporation, organized and existing under and by virtue of the laws of the State of Arizona, party of the first part, hereinafter designated the Owner, and _____ of the City of _____, County of _____, and State of _____, party of the second part, hereinafter designated the Contractor.

WITNESSETH: That the said Contractor has covenanted, and agreed, for and in consideration of the payments made as provided for in the proposal and specifications, to the Contractor by the said Owner, and under the penalty expressed in the bonds hereto attached, at his proper cost and expense to do all the work and furnish all materials, tools, labor, and all appliances and appurtenances called for by the Agreement, free from all claims, liens and charges whatsoever, in the manner, and under the conditions hereinafter specified, that are necessary for the construction of: **PROJECT - ** for the sum of: Dollars ($ _____).

The work done and materials and equipment furnished shall be strictly pursuant to and in conformity with the specifications and plans. The specifications and drawings furnished by the Contractor with his proposal and the additional drawings or prints and other information to be furnished by the Contractor in accordance with the specifications are made a part of this Agreement when and as approved by the City of Glendale, Arizona are intended to be complementary and all specifications, plans, drawings, or prints furnished by the Contractor and approved by the City of Glendale shall be complementary therewith. Any work appearing in or upon the one and not mentioned in the others shall be executed according to the true intent and meaning of the said specifications and plans, drawings, or prints the same as though the said work were contained and described in all.

The Notice to Contractors, Information for Bidders, General Conditions, Special and Technical Provisions, Proposal, Bid Bond, Payment Bond, Performance Bond, Certificate of Insurance, Appendix, Plans and Addenda thereto, are hereby understood to be a part of this Contract.

It is further covenanted and agreed that the work shall be executed under the direction and supervision of the City of Glendale, Arizona, or its properly authorized agents, on whose inspection all work shall be accepted or rejected.

The City shall have full power to reject or condemn all materials furnished or work performed under this contract which do not conform to the terms and conditions herein expressed.

To prevent all disputes and litigation, it is further agreed by and between the said City of Glendale, Arizona, and said Contractor, that the Community Development/Engineering Department, City of Glendale, shall determine all questions in relation to the work and the construction thereof, and it shall in all cases decide all questions which may arise relative to the execution of the work under this contract on the part of the said Contractor and its estimates and decisions shall be final and conclusive; and such estimates and decisions, in case any question may arise, shall be a condition precedent to the right of said Contractor to receive any money or compensation for anything done or furnished under this contract.

IN WITNESS WHEREOF, four (4) identical counterparts of this contract, each of which shall for all purposes be deemed an original thereof, have been duly executed by the parties hereinabove named, on the date and year first herein written.

CITY OF GLENDALE, ARIZONA ATTEST:
PARTY OF THE FIRST PART
(OWNER)

_____

CITY MANAGER
Title

City Clerk

(Seal)

APPROVED: (AS TO FORM)

_____
City Attorney

_____
PARTY OF THE SECOND PART
(CONTRACTOR)

WITNESSES:

_____ _____

_____ _____
Title Title

WOMEN-OWNED/MINORITY BUSINESS [ ] YES [ ] NO

CITY OF GLENDALE TRANSACTION PRIVILEGE TAX NO.

FEDERAL TAXPAYER ID NO. _____

INDIVIDUAL SURETIES WILL NOT BE ACCEPTED

STATUTORY PERFORMANCE BOND PURSUANT TO TITLE 34,
CHAPTER 2, ARTICLE 2, OF THE ARIZONA REVISED STATUTES
(Penalty of this bond must be 100% of the Contract Amount)

KNOW ALL MEN BY THESE PRESENTS:

That _____(hereinafter called the Principal), as Principal, and , a corporation organized and existing under the laws of the State of _____ with its principal office in the City of _____, (hereinafter called the Surety), as Surety, are held and firmly bound unto the City of Glendale, a municipal corporation, (hereinafter called the Obligee), in the amount of _____Dollars ($_____), for the payment whereof; the said Principal and Surety bind themselves, and their heirs, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, The Principal has entered into a certain written contract with the Obligee, dated the ____ day of , 20__, to construct **PROJECT -** , which contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall faithfully perform and fulfill all undertakings, covenants, terms, conditions and agreements of said contract during the original term of said contract any extension thereof, with or without notice to the Surety, and during the life of any guaranty required under the contract and shall also perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the Surety being hereby waived; then the above obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Title 34, Chapter 2, Article 2, of the Arizona Revised Statutes, and all liabilities on this bond shall be determined in accordance with the provisions of said Title, Chapter, and Article, to the extent as if it were copied at length herein.

The prevailing party or any party which recovers judgment on this bond shall be entitled to such reasonable attorney's fees as may be fixed by the court or a judge thereof.

Witness our hands this _____ day of_____, 20____.

Principal Seal

By

Surety Seal

Agency of Record

Agency Address

Telephone Number: _____

INDIVIDUAL SURETIES WILL NOT BE ACCEPTED

STATUTORY PAYMENT BOND PURSUANT TO TITLE 34,
CHAPTER 2, ARTICLE 2, OF THE ARIZONA REVISED STATUTES
(Penalty of this bond must be 100% of the Contract Amount)

KNOW ALL MEN BY THESE PRESENTS:

That, _____(hereinafter called the Principal), as Principal, and , a corporation organized and existing under the laws of the State of _____ with its principal office in the City of _____, (hereinafter called the Surety), as Surety, are held and firmly bound unto the City of Glendale, a municipal corporation, (hereinafter called the Obligee), in the amount of _____Dollars ($_____), for the payment whereof; the said Principal and Surety bind themselves, and their heirs, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, The Principal has entered into a certain written contract with the Obligee, dated the ____ day of , 20___, to construct **PROJECT -** which contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall promptly pay all monies due to all persons supplying labor or materials to him or his subcontractors in the prosecution of the work provided for in said Contract, then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that this bond having been required of the said Principal in order to comply with the provisions of Title 34, Chapter 2, Article 2, of the Arizona Revised Statutes, all rights and remedies on this bond shall inure solely to such persons and shall be determined in accordance with the provisions, conditions, and limitations of said Title, Chapter and Article, to the same extent as if they were copied at length herein.

The prevailing party or any party which recovers judgment on this bond shall be entitled to such reasonable attorney's fees as may be fixed by the court or a judge thereof.

Witness our hands this _____ day of_____, 20____.

_____
Principal Seal

By_____

Surety Seal

Agency of Record

_____
Agency Address

Telephone _____

CITY OF GLENDALE, ARIZONA
ENGINEERING DEPARTMENT CERTIFICATE OF INSURANCE

The _____

certifies that the following insurance policies have been issued on behalf of:

Name of Insured _____
Address of Insured _____

Name and Address of Additional Named Insured:
City of Glendale, Arizona
5850 West Glendale Avenue
Glendale, Arizona 85301

Type of Insurance	**Carrier**	**Policy No.**	**Effect. Date**	**Min Amt of Coverage**	**Expiration Date**	**Limits of Liability**
(1) Workmen's Compensation						Statutory
(2) Contractor's Protective Bodily Injury				$1,000,000		Each Occurrence
(3) Contractor(s) Protective Property Damage				$500,000 $500,000		Each Accident Aggregate
(3) Contractual Bodily Injury				$1,000,000		Each Occurence
(3) Contractual Property Damage				$500,000 $500,000		Each Accident Aggregate
(4) Automobile Bodily Injury & Property Damage				$500,000		Eacch Occurence
(5) Owner's Liability				$1,000,000		Each Occurrence

When the project includes construction of a new, or modification of an existing building **(in addition to the above types):**

(6) Fire and Extended Coverage plus Vandalism and Malicious Mischief for the full amount of the contract, with the City of Glendale named as an additional insured.

	Policy No.	**Expiration Date**	**Amount**

(7) Umbrella Coverage

	Policy No.	**Expiration Date**	**Amount**

Policy includes coverage for:

(A) 1. Damage caused by blasting
2. Damage caused by collapse or structural injury
3. Damage to underground utilities

(B) Liability assumed in construction agreements and other types of contracts or agreements in effect in connection with insured operations.

(C) All owned, hired or non-owned automotive equipment used in connection with the insured operation.

(D) Owner's Liability Policy shall remain in effect from date of final acceptance until the time limit for filing against the project has passed. Prior to final acceptance, Contractor shall provide an executed Certificate of Insurance extending the policy to this date.

It is agreed that none of these policies will be canceled or changed so as to affect this certificate until ten (10) days written notice of such cancellation or change has been delivered to the City of Glendale.

It is further agreed that:

These policies shall not expire until all work has been completed and the project has been accepted by the City of Glendale. **(If a policy does expire during the life of the Contract, a renewal Certificate of the required coverage must be sent to the City of Glendale not less than five (5) days prior to expiration date.)**

This certificate is not valid unless countersigned by an authorized representative of the Insurance Company.

Date: Countersigned by:

_____ _____

Signature

_____

Agency Address

Telephone _____

CITY OF GLENDALE, ARIZONA
PUBLIC WORKS/ENGINEERING DEPARTMENT

CONTRACTOR'S AFFIDAVIT
REGARDING
SETTLEMENT OF CLAIMS

PROJECT -

To the City of Glendale, Arizona

Gentlemen:

This is to certify that all lawful claims for materials, rental of equipment and labor used in connection with the construction of the above project, whether by subcontractor or claimant in person, have been duly discharged.

The undersigned, for the consideration of $_____ , as set out in the final pay estimate, as full and complete payment under the terms of the contract, hereby waives and relinquishes any and all further claims or right of lien under, in connection with, or as a result of the above described project. The undersigned further agrees to indemnify and save harmless the City of Glendale against any and all liens, claims of liens, suits, actions, damages, charges and expenses whatsoever, which said City may suffer arising out of the failure of the undersigned to pay for all labor performance and materials furnished for the performance of said installation.

Signed and dated at _____ , this _____ day of _____ , 20___.

Contractor

By

STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

The foregoing instrument was subscribed and sworn to before me this ___ day of _____, 20____.

Notary Public

My Commission Expires:

SUPPLEMENTAL GENERAL CONDITIONS

1. GENERAL: By Ordinance No. 1110 New Series, the City of Glendale adopted the "Uniform Standard Specifications for Public Works Construction," which are sponsored and distributed by the Maricopa Association of Governments. Copies of these documents, with revisions, are on file in the office of the City Engineer of the City of Glendale, and are hereby made a part of these Contract Documents.

Whenever in the Uniform Standard Specifications, the words "The Contracting Agency" are used, the meaning shall be the City of Glendale.

In all cases where ASTM, AASHTO, AWWA, USAG, Federal, City of Phoenix, MAG Specifications, Maricopa County, Arizona State Highway, or other standard specifications are referred to, unless otherwise stated, revisions, supplements or addenda issued on or before the date of this contract, shall prevail. In the event of any conflict between these project specifications and the requirements of the plans, detail drawings, MAG Standard Details and Specifications, these project specifications shall prevail.

2. DEFINITIONS: The following terms, as used in or pertaining to the Contract Documents, are defined as follows:

CITY: The word "City" refers to the City of Glendale, Arizona. The official representative of said City in these proceedings shall be the City Engineer.

CONTRACTOR: The word "Contractor" means the person, firm, or corporation with whom the Contract is made by the City.

MATERIALS: The term "Materials" includes, in addition to materials incorporated in the project, equipment and other material used and/or consumed in the performance of the work.

SUBCONTRACTOR: The word "Subcontractor" includes those having a direct contract with the Contractor and those who furnish material worked to a special design according to the plans and/or specifications for this work, but does not include those who merely furnish materials not so worked.

ENGINEER: The word "Engineer" means a person, firm or corporation duly authorized by the City, to act for the City in staking out the work, inspecting materials and construction, and interpreting plans and specifications.

CONTRACT DOCUMENTS: The words "Contract Documents" mean the Notice to Contractors, Information for Bidders, "Uniform Standard Specifications for Public Works Construction," Supplemental General Conditions, Special Provisions, Supplemental Specifications, Proposal, Contract, Payment Bond, Performance Bond, Certificates of Insurance, Plans and Addenda thereto.

3. PROPOSAL QUANTITIES: It is expressly understood and agreed by the parties hereto that the quantities of the various classes of work to be done and material to be furnished under this Contract, which have been estimated as stated in the Proposal, are only approximate and are to be used SOLELY for the purpose of comparing, on a consistent basis, the proposals offered for the work under this Contract; and the Contractor further agrees that the City will not be held responsible if any of the quantities shall be found incorrect; and the Contractor will not make any claim for damages or for loss of profits because of a difference between the quantities of the various classes of work as estimated and the work actually done. If any error, omission, or mis-statement is found to occur in the estimated quantities, the same shall not invalidate this Contract or release the Contractor from the execution and completion of the whole or any part of the work in accordance with the specifications and the plans herein mentioned, or for the prices herein agreed upon and fixed therefore, or excuse him from any of the obligations or liabilities hereunder, or entitle him to any damages or compensation except as may be provided for in this Contract.

4. WITHDRAWAL OF PROPOSALS: No proposal shall be withdrawn following the opening and reading of the bids for a period of 50 days from the date of opening without the consent of the contracting agency through the body or agent duly authorized to accept or reject the proposal.

5. RESPONSIBILITY FOR DAMAGE CLAIMS: The Contractor shall indemnify and save harmless the City and its officers, agents and representatives from all suits, actions, loss damage, expense, cost or claims of any character or nature brought on account of any injuries or damages sustained by a person or property arising out of the work done in fulfillment of the construction of the improvement under the terms of this agreement, or on account of any act or omission by the Contractor or his agents, or from any claims or amounts arising or recovered under Workmen's Compensation Laws or any other law, bylaw, ordinance, or order or decree.

6. LOSSES AND DAMAGES: All loss or damage arising out of the nature of the work to be done or from the action of the elements, or from any unforeseen circumstances in the prosecution of the same, or from any unusual obstructions or difficulties which may be encountered in and/or during the prosecution of the work, or

from any casualty whatsoever of every description, shall be sustained and borne by the Contractor at his own cost and expense except as otherwise provided by the contract documents or the laws of the State of Arizona.

7. DUST PREVENTION: The Contractor shall take whatever steps, procedures or means required to prevent abnormal dust conditions due to his construction operations in connection with this contract. The dust control measures shall be maintained at all times during construction of the project, to the satisfaction of the Engineer, in accordance with the requirements of the "Maricopa County Health Department Air Pollution Control Regulations" which have been adopted pursuant to the authority granted by Section 36-779, Arizona Revised Statutes.

The Contractor shall be required to obtain the necessary permit from the Maricopa County Air Pollution Control Bureau, 1001 N. Central Ave., Phoenix, Arizona 85004 - telephone (602) 506-6727.

8. EXCESS MATERIAL: Excess material shall be removed from the work site and wasted at a location approved by the Engineer. Broken concrete and asphalt may be delivered to the Glendale Sanitary Landfill located at 115th Avenue and Glendale Avenue. The prevailing regulations and fee schedule will not be waived for work under this project. All materials, to be disposed of at the landfill, shall be weighed and disposed of at the prevailing rate.

9. STOCKPILE OF MATERIALS: The Contractor may place or stockpile materials in the public right-of-way, if approved by the Engineer, provided they do not prevent access to adjacent properties or prevent compliance with traffic regulations.

Traffic shall not be required to travel over stockpiled materials, and proper dust control shall be maintained.

10. REFUSE COLLECTION ACCESS: At any time the project construction shall require the closure or disruption of traffic in any roadway, alley, or refuse collection easement such that normal refuse collection will be interfered with, the Contractor shall, at least 48 hours prior to causing such closure or disruption, make arrangements with the Field Operations Department in order that refuse collection service can be maintained.

11. CLEAN-UP: After all work under this contract is completed, the Contractor shall remove all loose concrete, lumber, wire, reinforcing, debris, and other materials not incorporated in the work, from the site of the work. Clean-up shall include the removal of all excess pointing mortar materials within pipes and removal of over-size rocks and boulders left after finish grading. The contractor shall provide for the legal disposal of all waste products, debris, etc., and shall make necessary arrangements for such disposal.

12. SHOP DRAWINGS: The Contractor shall provide shop drawings as may be necessary for the prosecution of the work as required by the contract documents. The Engineer shall promptly review all shop drawings. The Engineer's approval of any shop drawing shall not release the Contractor from responsibility for deviations from the contract documents. The approval of any shop drawing which substantially deviates from the requirements of the contract documents shall be evidenced by a change order.

When submitted for the Engineer's review, shop drawings shall bear the contractor's certification that he has reviewed, checked, and approved the shop drawings and that they are in conformance with the requirements of the contract documents.

Portions of the work requiring a shop drawing or sample submission shall not begin until the shop drawing or sample submission has been approved by the Engineer. A copy of each approved shop drawing and each approved sample shall be kept in good order by the Contractor at the site and shall be available to the Engineer.

13. PROTECTION OF FINISHED OR PARTIALLY FINISHED WORK: The Contractor shall properly guard and protect all finished or partially finished work, and shall be responsible for the same until the entire contract is completed and accepted, in writing, by the City. The Contractor shall turn over the entire work in full accordance with the specifications before final settlement shall be made.

14. STATUS OF EMPLOYEES: Contractor shall be responsible for assuring the legal working status of its employees and its subcontractor's employees.

15. LAWS AND REGULATIONS: This Contract shall be governed by and constructed in accordance with the laws of the State of Arizona. The Contractor shall keep himself fully informed of all existing and future City and County Ordinances and Regulations and State and Federal Laws and Occupational Safety and Health Standards (OSHA) in any manner affecting the work herein specified. He shall at all times observe and comply with said Ordinances, Regulations, or Laws.

16. PERMITS: The City has obtained certain required permits which are included in the project specifications, but it will be the duty of the Contractor to determine that all the necessary permits have been obtained. The

Contractor shall, at his own expense, obtain all required permits which have not been furnished by the City. A no-fee permit will be issued for work in the City of Glendale right-of-way and easement. (Also see Paragraph 7. Dust Prevention.)

17. ELECTRIC POWER AND WATER: The Contractor shall make his own arrangements for electric power and water. Subject to the convenience of the City, he may be permitted to connect to existing facilities where available, but he shall meter and bear the cost of such power or water. Fire hydrant meters may be obtained from the City of Glendale. Installation and removal of meters should be scheduled at least forty-eight (48) hours in advance through the Public Works/Utilities Division at 930-2700. A $325 deposit is required for each meter. The cost of the water is at the prevailing rate.

18. SURVEY CONTROL POINTS AND MONUMENTS: Existing survey monuments indicated on the plans or found during construction shall be protected by the Contractor, and in the event removal is necessary, removal and replacement shall be performed by permission of the Engineer, under direct supervision of the Engineer or his authorized representative. Survey monuments shall be constructed to conform to the requirements of MAG Specifications, Section 405, and Standard Details.

19. EXISTING UTILITIES: The Contractor is hereby advised that the location of all utilities, as shown on the plans, may not be complete nor exact and the Contractor shall satisfy himself as to the exact location of the utilities by contacting Blue Stake or the utility companies before proceeding with the work. After the underground utilities are located by Blue Stake or the utility company, the contractor shall excavate in a careful and prudent manner to prevent unwillful damage to the underground utilities.

In the event an existing underground City of Glendale water or sewer line, that has been properly identified, is damaged by the Contractor, the Contractor shall be responsible for the repairs at its expense.

The exact location of all existing underground service utilities, whether or not indicated on the plans, shall be determined by the Contractor at no expense to the City, and he shall conduct his work so as to prevent interruption of service or damage to them.

The Contractor shall protect existing utility services and be responsible for their replacement if damaged by him, or to make necessary adjustment in their location, if required, in order to complete the work for his Contract.

Utility companies and other interested parties have been provided with construction plans and the construction schedule for this project. The Contractor shall comply with MAG Specifications 105.6 to cooperate with the utility companies.

20. MAINTENANCE OF IRRIGATION FACILITIES: Where irrigation facilities interfere with construction, the Contractor shall remove and replace the affected irrigation facilities to its original condition. Final acceptance of replaced facilities will depend upon final approval of the Engineer.

21. OVERHEAD UTILITY LINES AND POLES: Contractor is advised that when work around overhead lines and poles is required on a project, he is required to coordinate with Utility Companies who own and operate overhead lines and poles. The coordination may include, but not be limited to the following activities: pole bracing, de-energizing of lines, and temporary relocations. Contractor is responsible to contact the applicable Utility Company representative and discuss his proposed construction methods; in order to determine what actions the Utility Company must take and the costs related to those actions. The Contractor shall include these costs in the applicable bid items for this project.

The primary and the backup representatives for this review and cost determinations are as follows:

Arizona Public Service:	Mr. Bobby Garza	602-371-7989
Qwest:	Mr. Ian Holmes	602-630-0496
Salt River Power:	Mr. Al Baizel	602-236-0840
Cox Communications:	Mr. Carl McKay	623-322-7214

22. SOUTHWEST GAS FACILITIES EXPOSED DURING CONSTRUCTION: The Contractor, upon exposing a gas line during construction, shall call SOUTHWEST GAS at 602-271-4277. The Southwest Gas patrolman will respond, usually within an hour, to inspect the line. Minor cuts or abrasions to the pipe coating will be rewrapped and tracer wire will be reconnected at no cost to the City.

23. UNDERGROUND UTILITIES' BEDDING: All water, sewer, storm drain, irrigation and other conduits installed within the City of Glendale shall be bedded from bottom of excavation to one foot above the pipe with granular bedding material meeting the requirements of Section 601.4.6 of MAG Uniform Standard Specifications. The initial bedding under the pipe is required for pipe having an inside diameter of 12 inches or larger, and in all cases where rock larger than 1-1/2" is encountered in the trench bottom.

24. SEWER SERVICE LINES: The Contractor shall be responsible for locating, and protecting from damage during construction, all sewer service lines within the project which are not owned by the City.
Contractor will be permitted to review the "as-builts" to assist Contractor in locating the non-City owned sewer service lines. These "as-builts" were prepared, and supplied to the City, by private developers or contractors who installed the non-City owned sewer service lines. Therefore, the City does not guarantee or warranty the accuracy of such "as-builts" and the contractor, as a condition for being allowed to review such "as-builts", hereby agrees to hold the City harmless for any and all damages or other expenses contractor may incur as a result of any inaccuracies or incorrect information in these "as-builts".

25. RIGHTS-OF-WAY: The City will provide rights-of-way and easements for all work specified in this Contract, and the Contractor shall not enter or occupy with man, tools, equipment or materials any private ground outside the property of the City of Glendale, Maricopa County, Arizona, without the consent of the Owner.

26. SUBCONTRACTS: Subcontracts shall be in accordance with, and the Contractor shall be bound by, the following provisions:

All subcontracts shall be subject to the approval of the City.

All subcontracts shall be in writing and shall provide that all work to be performed thereunder shall be performed in accordance with the terms of the Contract.

Certified copies of any and all subcontracts shall be furnished to the City Engineering Department; however, prices may be omitted.

Subcontracts shall conform to the regulations governing employment of labor.

The subcontracting of any part of the work will in no way relieve the Contractor of his responsibility under the Contract.

27. PRE-CONSTRUCTION CONFERENCE: After completion of the Contract Documents, to include bonds, insurance and signatures, and prior to the commencement of any work on the project, the Engineer will schedule a Pre-Construction Conference. This will be held at the City of Glendale, 5850 West Glendale Avenue, Glendale, Arizona.

The purpose of this Conference is to establish a working relationship between the Contractor, Utility Companies, and the Engineer. The agenda will include critical elements of the construction schedule, procedures for handling shop drawings and other submittals, cost breakdown of major lump sum items, payment application and processing, coordination with the involved utility companies, emergency telephone numbers for all representatives involved in the course of construction, and establishment of the Notice to Proceed date.

Minimum attendance by the Contractor shall be a responsible official of the company/corporation, who is authorized to execute and sign documents on behalf of the company/corporation.

28. OVERTIME:

Regular Work Hours: The work required to be performed by the Plans and Specifications for the Project shall be performed only during regular working hours, unless the City has authorized overtime work in accordance with the procedures set forth below. Regular working hours shall be defined as one 8-1/2 hour shift per day, Monday through Friday, or, upon prior approval of the City, one 10-1/2 hour shift per day on a compressed four day work week during Monday through Friday. Regular working hours shall not include Saturdays, Sundays or City recognized legal holidays.

Authorization and Costs: If the Contractor desires to schedule work for times other than regular work hours (overtime), the Contractor shall make a written request to the City at least two business days prior to the scheduled overtime. The City reserves the right to deny the request to work overtime based on the best interest and needs of the City. If an overtime request is denied, the City may, at its sole discretion, extend the contract time at no additional costs to the City.

In the event the Contractor does perform work overtime, with or without the prior approval of the City, the Contractor shall be responsible to the City for all additional costs that may be incurred by the City as a result of the Contractor's overtime work, including costs for engineering, inspections, testing, surveying and construction administration, all in accordance with MAG Section 108.5. However, the Contractor shall not be responsible for City's costs incurred as a result of overtime work requested by the City or overtime work resulting from an emergency which is not the responsibility of the Contractor or its employees, subcontractors or suppliers. The City's cost will be billed directly to the Contractor or may, at the City's option, be deducted from monies due the Contractor.

29. CONTRACTOR'S CONSTRUCTION SCHEDULE: Concurrently, with the execution of the contract and prior to the pre-construction conference, the Contractor shall submit a preliminary schedule for the Engineer's acceptance. The schedule shall be in sufficient detail to allow the Engineer to determine if the proposed schedule will conform to an approved program of construction operations, as determined by the contracting agency. Within ten calendar days after the preliminary schedule, described above, has been approved by the Engineer, the Contractor shall submit a progress schedule, utilizing the critical path method scheduling technique, showing the order in which he proposes to carry out the work, the dates on which he will start each phase of the work, and the contemplated date for completion of each phase. The Contractor shall not be permitted to commence construction until the schedule complying with this paragraph has been submitted to the City. The Contractor will not be granted any extension to the contract time or compensation for any damages as a result of the City's refusal to allow Contractor to commence construction until the critical path method progress schedule has been submitted and approved by the Engineer.

The critical path method (CPM) scheduling technique requires a breakdown of the entire work into individual tasks and an analysis of the number of days required to perform each task. The schedule submitted to the City should highlight and identify the critical path for the project. After the work is in progress, the Contractor shall submit supplementary progress schedules, using the critical path method technique, of the progress to date and projection for completion. The supplementary progress schedules shall be submitted with each pay request in accordance with the paragraph, "Payments to Contractors," of these Supplemental General Conditions. The progress schedules shall be subject to the approval of the Engineer. In the event the Contractor fails to submit a supplementary progress schedule acceptable to the Engineer, the City may withhold further progress payments to the Contractor until the Contractor submits an acceptable supplementary progress schedule, which is approved by the Engineer, to the City. Schedule changes requiring an increase in the City's engineering personnel on the project shall not be put into effect until the Engineer has approved such increase and made arrangements for the required additional personnel.

30. CHARACTER OF WORKMEN: None but skilled foremen and workmen shall be employed on work requiring special qualifications. When required by the Engineer, the Contractor shall discharge any person who is, in the opinion of the Engineer, disorderly, dangerous, insubordinate, incompetent, or otherwise objectionable. The Contractor shall keep the City harmless from damages or claims for compensation that may occur in the enforcement of this section of the specifications.

31. HINDRANCES AND DELAYS: Except as otherwise provided herein, no charge shall be made by the Contractor for hindrances or delays from any cause during the progress of the work embraced in this Contract; but such delays, if due to no fault or neglect of the Contractor, shall entitle the Contractor to an extension of time allowed for completing the work, sufficient to compensate for the delay, the amount of the delay to be determined by the Engineer, provided the Contractor shall give said Engineer immediate notice in writing of the cause of such delay.

31.1 Delay: In the event of a delay for which the City is solely responsible, which is unreasonable under the circumstances and which was not within the contemplation of City and Contractor at the time this Contract is executed, City and Contractor shall negotiate, in good faith, a payment by the City to Contractor for the expenses incurred by Contractor as a result of such delay, in accordance with the City of Glendale Engineering Department's POLICY STATEMENT FOR CALCULATING DELAYS AND DAMAGES. This provision shall not be construed to void any provision in the contract which requires notice of delay or provides for liquidated damages. However, if the delay is the result of any act or neglect of a third party, including the architect, engineer or other contractor employed by the City, or by labor disputes, fire, unusual delay in transportation, adverse weather conditions not reasonably foreseeable, unavoidable casualties, or any causes beyond the Contractor's control, the Contractor shall not be entitled to any payments or compensation for expenses incurred as a result of such delay, but the Contract Time shall be extended by Change Order for such reasonable time as the Engineer may determine. No extension or compensation will be granted for any delay which is the result, wholly or partially, of any act or neglect of Contractor or any Subcontractor hired by Contractor.

32. LIQUIDATED DAMAGES:

32.1 Should the contractor fail to substantially complete the work under this contract within the time for completion stated in the paragraph "Time of Completion," in the Information for Bidders, then the contractor shall pay the City of Glendale, Arizona, liquidated damages, pursuant to the provisions of Section 108.9, Standard Specifications for Public Works Construction, Maricopa Association of Governments, until the work is substantially complete.

32.2 Should the contractor fail to fully and finally complete the work under this contract within the time for completion set forth in the paragraph "Time of Completion," in the Information for Bidders, even though the contractor has achieved substantial completion of the work within such time, then the contractor shall pay the City of Glendale, liquidated damages (pursuant to the provisions of Section 108.9, Standard Specifications for Public Works Construction, Maricopa Association of Governments), in an amount equal to 50% of the applicable

liquidated damage rate set forth in MAG Section 108.9 for each and every calendar day of delay until the work is fully and finally complete and accepted.

32.3 The date of substantial completion shall be the date when the work is sufficiently complete, in accordance with the contract documents, so the owner can fully occupy and utilize the work or designated portion thereof for the use for which it is intended, with all the project's parts and systems operable as required by the contract documents and all the work is complete, accessible, operable, and usable by the owner for its intended purpose(s), and all parts, systems and sitework are 100% complete and cleaned for the owner's use. Only incidental corrective work and final cleaning (if required), beyond cleaning needed for the owner's full use, may remain for final completion.

32.4 Full and final completion shall be that date when all work under the project, including incidental corrective work under punch list and final cleaning, has been completed and the entire project is accepted by the owner.

33. CANCELLATION OF STATE CONTRACTS: Pursuant to A.R.S. Section 38-511, the City of Glendale may, within three years after execution of the contract documents, cancel the contract, without penalty or further obligation, if any person significantly involved in initiating, negotiating, securing, drafting or creating the contract on behalf of the City of Glendale is at any time while the contract or any extension of the contract is in effect, an employee or agent of any other party to the contract in any capacity or consultant to any other party of the contract with respect to the subject matter of the contract.

34. PAYMENTS TO CONTRACTOR: The measurements of quantities and the payments to the Contractor shall be in accordance with MAG Uniform Standard Specifications for Public Works Construction, Part 100 - General Conditions, Section 109 - Measurements and Payments.

Payments will be made on the basis of itemized, monthly statements prepared by the City and signed by the Contractor. The Contractor shall submit an itemized, duly certified and approved estimate for work completed through the last day of the preceding month in accordance with MAG Specifications, as amended by these Supplemental General Conditions. Upon approval of the pay estimate, the City will mail the check directly to the Contractor.

The pay estimate shall be accompanied by an updated progress schedule as required by these Supplemental General Conditions and a cash flow report when required by the Special Provisions. Approval of progress payments shall be conditional upon submittal of progress schedules and cash flow reports, when required, which are acceptable to the Engineer.

Upon 100% completion and acceptance of the project, and with the request for final payment, the Contractor shall complete and submit the "Contractor's Affidavit Regarding Settlement of Claims" form which is included in these specifications. Before final payment and release of retention, Contractor must arrange for its Surety to provide the City with a fully executed AIA Consent of Surety form. To avoid delays in the final payment, the Surety may send the Consent of Surety directly to the City via fax at (623) 915-2689, and mail the original to the City of Glendale Engineering Department, 5850 West Glendale Avenue, Glendale, Arizona 85301.

END OF SUPPLEMENTAL GENERAL CONDITIONS

SPECIAL PROVISIONS

1. SCOPE OF WORK:

2. DEFINITIONS:

A. Section: Reference to a Section on the plans or in these Specifications shall mean a Section of the Uniform Standard Specifications for Public Works Construction, sponsored and distributed by Maricopa Association of Governments (MAG), latest revision. The provisions of MAG Uniform Standard Specifications and Details for Public Works Construction, which are not altered or modified by the drawings or by these Special Provisions or by any subsequently issued Addendum, shall apply to the contract even though the Contractor's attention is not specifically drawn to such provisions.

B. Standard Detail: Reference to a MAG Standard Detail (MAG S.D.) on the plans or in these specifications shall mean a standard detail drawing in the latest revision of the Uniform Standard Specifications for Public Works Construction, sponsored and distributed by Maricopa Association of Governments. City of Glendale Standard Detail (C.O.G. S.D.) shall mean a standard detail drawing in the City of Glendale's Engineering Design and Construction Standards, latest revision. City of Phoenix Standard Detail (C.O.P. S.D.) shall mean a standard detail drawing in the Phoenix Supplemental Standard Details for Public Works Construction, latest revision.

3. LINES AND GRADES: The Engineer shall provide line and grade boards or stakes at control points and at intervals not less than 50 foot. The Contractor shall provide such materials and give such assistance as may be required for setting line and grade boards or stakes. The Contractor shall give notice to the Engineer not less than two working days in advance as to his need for additional grades and lines, in order that they may be furnished with a minimum of inconvenience to the City or of delay to the Contractor.

The Contractor shall be responsible for checking construction stakes for line and grade. If any discrepancies are found, between staking and approved plans, the Contractor shall notify the Engineer in writing prior to construction of any portion of work which discrepancy would affect in order to field check the staking and to make any adjustments and restaking of that portion of work. The Contractor shall be responsible for preserving all stakes set and shall take all steps necessary to insure that stakes are not disturbed or tampered with, and if in the area of any discrepancy, the stakes set are missing, moved or disturbed, the Contractor shall be responsible for the costs incurred to restake, remove and replace that portion of project where the discrepancy occurs.

4. SUSPENSION OF WORK: The Engineer reserves the right to suspend the work wholly or in part if deemed necessary for the best interest of the City. This suspension will be without compensation to the Contractor, other than to adjust the contract time in accordance with Section 108.

5. COMPLIANCE WITH MANUFACTURER'S INSTRUCTIONS: In all instances wherein the item and/or specifications require installation or construction in accordance with either manufacturer's or supplier's recommendations and/or instructions, said recommendations and/or instructions shall be submitted with the applicable portions clearly marked for approval prior to the commencement of work on that item or portion of the contract.

6. TRAFFIC REGULATIONS:

6.1 All traffic affected by this construction shall be regulated in accordance with the City of Phoenix "Traffic Barricade Manual," and these Special Provisions. The following traffic restrictions are minimum requirements throughout the construction period:

6.1.1 All traffic restrictions listed herein are to supplement the City of Phoenix "Traffic Barricade Manual," and are not intended to delete any part of the manual. All reference in the "Traffic Barricade Manual" to "arterial" and/or "collector" streets shall mean "arterial and/or major arterial" streets and are referred to as "major" streets in the following sections.

6.1.2 A minimum of two travel lanes (one for each direction) shall be maintained open to traffic at all times on all major streets. All work that enters or crosses a major street must be done at times other than 6:00 a.m. to 8:30 a.m., and 4:00 p.m. to 7:00 p.m.

6.1.3 A travel lane shall be defined as ten (10) feet of roadway with a safe motor vehicle operating speed of twenty-five (25) miles per hour.

6.1.4 A travel lane will not be considered as satisfactorily open to traffic until it has been graded reasonably smooth and is paved with a minimum of two (2) inches of asphalt. This shall be considered temporary pavement and shall be removed completely before proceeding with final surfacing.

6.1.5 The Contractor shall provide and maintain all necessary traffic controls, and must provide flashing arrow boards to protect and guide traffic for all work in the construction area.

6.1.6 Intersection area shall be defined as all of the area within the right-of-way of intersecting streets, plus two-hundred fifty (250) feet beyond the center of the intersected streets on all legs of the intersection.

6.1.7 The Contractor shall maintain all existing traffic signs erect, clean and in full view of the intended traffic at all times. Street name signs at major street intersections shall be maintained erect at all times. If any signs interfere with construction, the Contractor shall notify the Inspector at least 48 hours in advance for City forces to remove said signs. The Contractor shall be responsible for having all temporary traffic control signs installed and maintained during construction. The Transportation Department will re-set all traffic and street name signs to permanent locations when notified by the Engineer that construction is complete.

6.1.8 Local access to all properties on the subject project shall be maintained at all possible times in the form of a safe and reasonable direct route to at least one of the above defined major streets. Whenever local access cannot be maintained, the Contractor shall notify the affected property owner or user and the Engineer at least twenty-four (24) hours in advance.

6.1.9 The Contractor shall be required to provide a uniformed off-duty City of Glendale police officer to assist with traffic control whenever traffic in any one direction is restricted to one lane at a signalized major intersection or at other locations if it should become necessary in the opinion of the Engineer. During construction activities that do not restrict a major signalized intersection, police officer assisted traffic control is not required. If the Contractor chooses to use a police officer at other locations during peak traffic hours or to assist with his other traffic control operations, the cost shall be included in the lump sum for "Traffic Control" and not paid out of the hours allowed for "Off Duty Glendale Police Officer." All requests for off-duty officers will be made through the Glendale Police Department, Off-Duty Work Administrator. The Contractor must provide evidence of workmen's compensation coverage before any officer will be permitted to work.

Measurement for payment of the uniformed off-duty Glendale police officer hours will be made by the actual number of man-hours used for traffic control at signalized major intersections or as approved by the Engineer. Because the quantity of hours is dependent on the Contractors schedule of activities, the unit price bid for this item will be administered as a contingency bid item and any adjustment in hours will not be subject to the 20 percent limitation.

Payment for the off-duty Glendale police officer will be made at the contract unit price bid per hour for OFF DUTY GLENDALE POLICE OFFICER and shall include the net hourly rate of $25.00 per police officer and $27.00 for a supervisor, both with a three (3) hour mimimum. The net hourly rate shall be increased to include withholding for Federal, State, FICA, Medicare, Workmen's Compensation insurance and any payroll administrative costs.

6.1.10 The Contractor shall prepare a traffic control plan for the project and submit it to the City Transportation Director for review and approval at least seven (7) working days before the pre-construction conference. The traffic control plan shall include flashing arrow boards, barricades and signs, and shall address how local access to adjacent properties will be handled in accordance with the specifications herein. Any changes to the traffic control plan during construction shall be submitted to the City Transportation Director for approval at least seventy- two (72) hours before implementation.

Payment for this item shall be made at the contract lump sum price for TRAFFIC CONTROL.

6.1.11 It is the City's desire to maintain one lane of traffic in each direction on minor streets whenever possible. Should it become imperative for the Contractor to close off a portion of any minor street or reduce the travel way to a single lane, he must obtain approval from the City Transportation Director twenty-four (24) hours prior to implementing a traffic control change. He must provide all the necessary signs to detour traffic and/or flagmen to control traffic for a single lane. The maximum amount of time that the street may be closed is from 9:00 a.m. until 4:00 p.m.

7. ENERGIZED AERIAL ELECTRICAL POWER LINES: The utility company maintains energized aerial electrical power lines in the immediate vicinity of this project. Do not consider these lines

to be insulated. Construction personnel working in proximity to these lines are exposed to an extreme hazard from electrical shock. Contractors, their employees, and all other construction personnel working on this project must be warned of the danger and instructed to take adequate protective measures, including maintaining a minimum ten (10) feet clearance between the lines and all construction equipment and personnel. (See: OSHA Standard 1926.550(a)15.) As an additional safety precaution, Contractors should also be instructed to call the utility company to arrange, if possible, to have these lines de-energized or relocated when the work reaches their immediate vicinity. The cost of such temporary arrangements would be borne by the Contractor. The utility company can often respond to such requests if two days advance notice is given, but some situations may require up to sixty (60) days lead time for relocation or other arrangements.

8. WEEKLY NEWSLETTER: The Contractor shall prepare, subject to the approval of the Engineer, and distribute on a weekly basis by U.S. Mail, a one page newsletter containing a brief description of the work completed during the past week and work expected to be accomplished during the next week. Information such as, but not limited to, detours or hotline telephone numbers shall be included as required. Payment shall be made as a proportionate share of the lump sum as based on original calendar completion date, however, the Contractor shall continue preparation and distribution until one week after the date of substantial completion. The City shall supply the Contractor with a list of names and addresses not to exceed 500.

9. CONCRETE GUTTER WATER TESTING: The MAG Uniform Standard Specifications, Section 340.3, CONSTRUCTION METHODS, shall be modified as follows: The 1/2 inch referenced in Paragraph 16 beginning, "When required by the Engineer, gutter having a slope of 0.8 foot...," shall be changed to 1/4 inch.

10. RECORD DRAWINGS: The Contractor shall maintain one set of contract drawings with all changes, deviations, additions and deletions clearly marked thereon. Upon completion of the work, this set of drawings, shall be marked "RECORD DRAWINGS," dated, and delivered to the Engineer prior to approval of the Contractor's final payment request.

11. SOILS REPORT: The boring logs and soils report for this project are available for review at the City Engineering Office upon request. The boring logs and soils report are provided only as a courtesy. The logs and soils reports are not incorporated into, or part of, the contract and the City of Glendale makes no warranties, express or implied, as to the accuracy of the information contained therein. The Contractor should not rely on the information contained therein and should perform its own investigation as to the subsurface conditions of the project. The logs and soils reports are not intended, nor should they be relied upon by the Contractor as, a representation of the true soil conditions of the project. If there is a conflict between this provision and any other provision of the contract documents, this provision will prevail. The Contractor will accomplish the project under whatever condition he finds at the contract price.

12. CASH FLOW REPORT: The Contractor shall prepare a Cash Flow Report for projected monthly project cash flow on a City provided form and submit it for approval prior to issuance of the Notice to Proceed. The accumulation of monthly pay estimate costs shall be plotted versus time in accordance with the proposed construction schedule. After approval, the Contractor shall submit an updated Cash Flow Report prior to the receipt of each Progress Payment. Each updated Cash Flow Report shall reflect the Contractor’s actual monthly payment versus the actual elapsed contract time.

At the City’s request, if the projected monthly project cash flow varies by more than ten percent of the total contract price, the Contractor shall prepare a revised Cash Flow Report. Each revised Cash Flow Report is subject to approval by the City prior to issuance of the progress payment.

Revisions to the report resulting from Contractor initiated delays or work schedule changes shall be at no cost to the City. Any revisions required by City initiated delays or changes to the work shall be paid as an integral part of the approved Change Order.

13. CONSTRUCTION SIGN: The project type to be indicated on the sign shall be . See "Construction Sign Detail."

END OF SPECIAL PROVISIONS

DIVISION 01 - GENERAL REQUIREMENTS

01 10 00 Summary

01 Description of the Project and general project requirements.

02 Provide listing and, if necessary, description of work to be performed by the Owner under separate contract and/or in conjunction with this contract.

03 Provide listing of materials and equipment to be furnished by the Owner for installation at the job site.
- a. State where products will be delivered by Owner or Owner's vendor, i.e., to the jobsite, or other location.
- b. Contractor to coordinate receipt and installation of Owner/vendor furnished products.
- c. Indicate items to be furnished and installed by Owner's or other authorized vendor and coordination/installation support by the Contractor.

04 Describe limitations, if any, on Contractor's use of the site, limits of construction, and other limitations or conditions.

05 Note utility limitations and requirements.

06 Owner's use of site.
- a. Describe continuing or early occupancy of all or portion of the Project. Note any Owner limitations or requirements.

07 Permits, in general, to be issued by City of Glendale. Verify and indicate requirements for permitting and plan check, including costs.

08 Note any other special requirements.

01 10 13 Fire Department Contractor's Guide

(Note: For Fire Suppression systems refer to Division 21.)

01 Fire Department Contractor's Guide is published by the Fire Marshal's Office to provide information concerning fire code issues and to provide information regarding what a fire inspector needs to successfully complete an inspection.

The project will be assigned an inspector by the Fire Marshal's Office who will interact with designers and contractors and provide required inspections.

The goal is to achieve code compliance by partnering and assisting in the satisfactory completion of the project. In order to be successful, communication is critical. If an issue is communicated to the inspector an early solution can generally be worked out that will satisfy everyone.

Following is the content of the Guide:

02 Fire Safety During Construction, Alteration or Demolition of a Building.

a. General Contractor
The general contractor is responsible for the fire safety of all property under his/her control. The general contractor will ultimately be held responsible for any fire code violations that may occur on the job site.

b. Fire Apparatus Access Roads
Fire apparatus access roads are required during construction to allow emergency response vehicles onto the site for both fire and medical emergencies. Access roads shall be in place when combustible construction materials are brought onto the site or prior to the start of vertical construction, whichever comes first. In some cases, depending on the circumstances, access roads may be required at an earlier stage of the project. Access roads are to be twenty feet wide with an approved turn-around if longer than 150 feet.

During construction temporary access roads may be provided as long as they comply with the following:

1) The fire apparatus access road shall be an all weather driving surface, graded to drain standing water and engineered to bear the imposed loads of fire apparatus when the roads are wet. The minimum surface shall be six inches of ABC compacted to 90 percent over an approved base. Compaction test results shall be provided to the inspector *prior* to approval. Alternate methods may be approved when designed and sealed by a professional engineer and approved by the fire department.

2) All open trenches in a fire apparatus access road shall be plated at all times with steel plates capable of maintaining the integrity of the fire apparatus access road design.

3) The access road must reach to within 150 feet of all points of any building, combustible construction materials, and combustible debris storage areas.

4) The edges of the access road shall be marked.

5) All fire apparatus access roads shall be clearly marked at the entrance with an approved sign approximately three feet by four feet. The lettering shall be red on a white background with letters a minimum of four inches tall using a minimum ¾ inch stroke and shall include the address of the site and shall include the words “Fire Access Road.” If appropriate, the use of arrows may be approved by your inspector. Also, additional access road markings may be required throughout the project.

c. Fire Hydrants
Prior to bringing combustible building materials on to the site, there shall be approved fire hydrants installed and *operating* at the access points to the site. *Operating* means being fully tested, chlorinated, and approved by Public Works. If combustible construction materials are stored further than 150 feet from said hydrant, additional hydrants shall be installed so that the 150-foot access limit is maintained. For temporary storage an approved temporary piping and hydrant system may be acceptable. Plans for such a system must be submitted and approved prior to installation.

d. Combustible Waste
Combustible waste shall not be allowed to accumulate on any site except in approved containers. Waste material shall be removed from the building on a daily basis. Combustible debris, waste material, or trash shall not be burned on the site.

e. Fire Extinguishers
Fire extinguishers are required in a building under construction or during alteration or demolition. Fire extinguishers shall be located within a 75-foot travel distance of any location in the building. Extinguishers shall be installed in plain view in an accessible location, and away from hazardous areas.

f. Asphalt Kettles
Asphalt kettles shall not be used inside of or on top of any building. One 20BC fire extinguisher is required to be on the roof of the structure being covered. If a kettle has no operating thermostat there must be an attendant within 100 feet of the kettle while the burner flame is on; also, no ladders or similar obstacles shall form the route to the kettle. The kettle shall be no closer than 20 feet to any building or structure.

g. Heaters
All heaters used in structures must be designed and approved for inside use. Heaters shall not be used in areas where they will create a hazard. Adequate ventilation must be provided for fuel burning heaters. Heaters must be turned off, moved to a safe distance from any structure, and allowed to cool before fueling.

h. Hot Work
Any person using a torch or other flame-producing device for removing paint, sweating pipe joints, applying roofing materials, or any other process requiring an open flame device in any building or structure shall provide one approved fire extinguisher or a water hose equipped with a suitable nozzle. When using a water hose, it must be of sufficient length to reach all portions of the building where hot work is being conducted and must be connected to a water supply on the premises where the hot work operation is being performed. Combustible material in the proximity to an open flame shall be protected against ignition by shielding, wetting, or other means. **In all cases a fire watch shall be maintained** in the vicinity of the operation **for no less**

than one-half hour after the torch or flame-producing device has been used.

i. Warming Fires
The following rules shall be followed for warming fires at construction sites:

1) No warming fires shall be ignited or maintained unless the fire is contained in an APPROVED waste burner located safely and at least 25 feet from any structure. An approved waste burner is a 30 or 55-gallon metal drum, intact, with a spark arrester, constructed of iron or heavy wire mesh with openings no larger than 1/2 inch.

2) The fire must be attended AT ALL TIMES by a competent person who shall have a garden hose attached to an approved water supply or other fire extinguishing equipment readily available for use. This means somebody must be specifically assigned to attend the fire. It is NOT permissible to leave the fire unattended. The fire must be completely extinguished before leaving it unattended.

3) The burning of material shall not cause or create dense smoke or odor. If this occurs the warming fire shall be extinguished.

4) All burning shall meet the requirements of the Maricopa County Health Department Division of Air Pollution. You must check daily to see if it is permissible to burn.

5) The Chief may prohibit any and all fires when it is deemed that they are hazardous.

j. Storage And Use Of Flammable Liquids
The storage of all flammable liquids shall be in an area approved for flammable liquid storage. The storage of all flammable liquids must be in containers designed for their use. Flammable liquids **shall not** be stored in buildings under construction. All containers used for the storage of flammable liquids must be labeled with the liquid they contain. A permit is required for the storage or use of more than 5 gallons of flammable liquids or 25 gallons of combustible liquids inside or more than 10 gallons of flammable liquids or 60 gallons of combustible liquids outside. Check with your inspector.

k. Knox Boxes
A Knox Box, padlock, key switch, or other Knox device may be required. Please take the following steps:

1) In general, the Knox box shall be located in the area of the main entrance or in the area of the door for which the box is being provided.

2) The applicant shall contact their fire inspector (623-930-3401) regarding the location of the device and provide plans for its installation. Once approved, the applicant shall obtain a Knox Company order form from the Glendale Fire Marshal's Office or from any FMO inspector. Instructions are on the form.

3) Keys are locked into the Knox device(s) by FMO personnel. Please call 623-930-3401 to request this service.

4) *For security purposes, it is highly recommended that all wall-mounted boxes are designed to be flush mounted. Early attention to this requirement will allow appropriate construction decisions to be made to facilitate the installation.*

l. Fire Lane Signs
If fire lane signs are required the location of the signs should be shown on the approved plans. If fire lane signs are not shown on the approved plans call 623-930-3401 for assistance in locating the signs. The signs shall be in accordance with City of Glendale Standard Detail G-434. All signs are to be installed perpendicular to the road and facing the direction of travel so drivers can readily identify the fire lane. All fire lane signs must include a yellow acceptance sticker to be effective, which are installed by the fire inspector at the time of inspection. Painting the curb red is acceptable, but not required and does not negate the need for signs.

03 Inspection and Testing

a. **All requests for acceptance testing shall be made by contacting the Glendale Fire Marshal's Office (623-930-3401) no less than 48 hours in advance.**

b. Approved plans and permits bearing the red fire department stamp shall be on the job site at all times. No inspections or tests will be conducted without them.

c. Unless otherwise approved in writing, through the alternate means and methods section of the fire code, all systems shall be designed and installed in accordance with the Glendale Building and Fire Code and the approved standards. This is generally NOT the most current edition of the standard. It is the contractor's responsibility to use the proper adopted standard.

d. It is expected that systems are pre-tested by the contractor and all corrections made ***prior*** to calling for an acceptance inspection. The permit fee provides for two inspections. Generally, this may be considered as one inspection with one free re-inspection. **There will be an additional charge for the original permit fee or $200; whichever is less, for each inspection exceeding two inspections. Also, scheduled**

inspections for tests not canceled prior to the day of the scheduled test will be counted as a test.

e. Acceptance test inspections are for the system covered by the permit. This may include the entire building, only a portion of the building, or a piece of equipment. If you choose to test a single system in phases, the two-inspection rule stated in item four above will still apply. There will be additional inspection charges for each inspection exceeding two on each system. If you are unsure about the requirements for your test, call your inspector.

f. Sprinkler Systems
A minimum of three separate inspections is required prior to approval of new sprinkler systems and final approval for a Certificate of Occupancy.

1) Underground Hydrostatic Two-Hour Pressure Test

(a) Systems shall be pre-tested by the contractor.

(b) Tested hydrostatically at 200 p.s.i. for 2 hours.

(c) ***All*** joints must be fully exposed.

(d) Thrust blocks or other approved mechanical restraints must be in place and visible.

(e) The pressure test gauge must be located at lowest end of the system being tested.

(f) A flush will be conducted after approval of the underground pressure test. All check valves must be in ***full*** open position.

(g) The contractor completing the work shall provide the Glendale Fire Department a completed Contractor's Material and Test Certificate for Underground Pipe (NFPA 13).

2) Overhead Hydrostatic Two-Hour Pressure Test and Rough-in Inspection

(a) Systems shall be pre-tested by the contractor.

(b) Tested at 200 p.s.i. for two hours.

(c) All system piping must be visible from floor level. ***NO*** *sheet rock or ceiling tile can be installed prior to the testing or inspection of the piping system without the approval of your fire inspector. You will be required to remove any obstructions to viewing the complete piping system before an inspection will be conducted.* (Glendale Fire Code Section 103.3.2.1)

(d) The contractor completing the work shall provide the Glendale Fire Department a completed Contractor's Material and Test Certificate for Aboveground Pipe (NFPA 13).

3) Final Inspection
The contractor completing the work prior to final inspection shall provide both the completed Contractors Material and Test Certificates to the Glendale Fire Department.

The final inspection includes:

(a) Visual inspection of the entire system (drywall and ceiling panels shall be in place).

(b) Exterior bell tests, including third party monitoring, with the installation of over 100 heads.

(c) When system monitoring is required, **a separate permit from the Fire Department is required for the monitoring of the sprinkler system.** Permit must be obtained prior to testing.

(d) A hydraulic calculation data plate (NFPA 13) must be installed on all calculated systems. The use of magic markers, embossed tape labels, or metal impression labels is NOT allowed. Stamped or engraved metal plates are required.

(e) Sprinkler head box shall be properly installed, which is stocked with sprinkler heads, wrench, and a NFPA 25 booklet.

(f) Supervision of all valves.

(g) System shall be fully operational.
- All signage shall be installed.
- Two-inch main drain test.
- Inspectors test and time water flow alarm
- Pressure drop test across the backflow device, if installed.
- Other tests or inspections that may be required.

g. Fire Alarm Systems

1) All fire alarm systems shall be installed in accordance with the Glendale Fire Code.

2) All tests shall be requested by the sub-contractor actually doing the work. **Scheduled appointments for tests not canceled prior to the day of the scheduled test will be counted as a test.**

3) The entire system shall be fully installed, operational and pre-tested prior to system acceptance by the Fire Department.

4) All control panels, initiating and signaling devices, power supplies and auxiliary devices shall be tested in the presence of the inspector.

5) All devices to be tested shall be tested in accordance with manufacturers' recommendations. It shall be the responsibility of the installer to provide the equipment and supplies necessary to conduct the test.

6) A copy of the approved plans shall be *permanently* maintained at the fire alarm panel.

7) An approved simplified floor plan of the areas served by the alarm panel shall be posted near the annunciator panel. Zone descriptions and /or devices shall correspond with the floor plan. Check with your inspector.

8) A Certificate of Completion (NFPA 72) shall be completed and provided to the Glendale Fire Department prior to acceptance.

h. Kitchen Hood Systems
Kitchen hood systems shall be installed in accordance with the Glendale Fire Code.

Testing includes:

1) The permittee shall perform all tests.

2) All actuation components including remote manual pull stations, mechanical or electrical devices, detectors, actuators, etc., shall be checked for proper operation during the inspection in accordance with the manufacturers' listed procedures.

3) Gas shall be supplied to the equipment being protected by cooking equipment prior to testing.

4) Electrical power required for acceptance testing of systems can be provided by an approved portable supply source.

5) Upon activation of the system, the makeup air supply to a hood shall be shut down and hood exhaust fans shall continue to run unless shutdown is required by the extinguishing system or unless another component of the system requires shutdown. (NFPA 96)

6) If the building has a fire alarm system, the kitchen system must be electronically connected to provide a supervisory signal.

03 Certificate Of Occupancy

a. All requests for Certificate of Occupancy inspections shall be called in to the Glendale Fire Marshal's Office (623-930-3401) no later than **48 hours** prior to the date required.

b. **Approved plans** bearing the Fire Department stamp and all **permits** must be available at the job site at all times from the start of construction through final Certificate of Occupancy inspection. Your fire inspector will give you paperwork for each inspection conducted at your project. Keep this paperwork on the job site. You may be required to provide documentation that an inspection has been completed and it is expected that you will be able to provide the paperwork.

c. In order to obtain Fire Department sign off on the Certificate of Occupancy, the following minimum conditions must apply:

1) All automatic fire protection and life safety systems and equipment including sprinklers, fire alarms, smoke control, emergency lighting, etc. must be installed, tested and in full operation and all fire department permits shall be signed off. If third party monitoring is required it shall be operational.

2) All occupancies shall have proper fire extinguishers required for the occupancy. Check with your inspector.

3) All paving must be completed and signage must be installed. Addresses must be posted and, if required, a graphic directory must be installed. Separate building identification, if required, shall be installed. Check with your inspector.

d. **APPROVED PLANS AND PERMITS MUST BE ON THE JOB SITE DURING CONSTRUCTION AND TESTING**

01 20 00 Price and Payment Procedures

01 Application for Payment shall be on a notarized AIA Document G702, Application and Certification for Payment, supported by approved AIA Document G703, Continuation Sheet. A minimum of three (3) original copies of these forms shall be submitted for each application.

02 Each Application for Payment shall be accompanied by lien releases for the previous payment, substantiation for stored materials, monthly progress reports and updates, and any other pertinent items.

03 When acceptable to the Owner, the Contractor may submit for payment on properly stored materials not yet incorporated into the work. Materials stored off the job site must be in the supplier's storage area, separated from other materials, and clearly labeled for this particular project. Insurance certificates for the material naming the Owner as an additional insured, loss payee shall be delivered with the pay request.

01 30 00 Administrative Requirements

01 Project Meetings
- a. Pre-construction Conference: Prior to start of construction Contractor, and representatives of major Subcontractors, shall meet with Owner and Architect. The purpose of this conference is to discuss the Project in detail, including scheduling of Work, and to answer questions.
- b. Project Progress Meetings: To be held weekly, including representatives of Owner, Architect, Contractor and designated subcontractors

01 40 00 Quality Requirements

01 Inspection and Testing agency will be employed by Owner to perform specified inspections and testing.

02 For Fire Marshal's inspection and testing of fire safety and fire suppression equipment and systems refer to Section 01 10 13 Fire Department Contractor's Guide.

01 50 00 Temporary Facilities and Controls

01 Contractor to provide temporary office space for use of his personnel in the conduct of the Work, Owner's personnel and Architect. Jobsite office shall have the following minimum facilities:
- a. In addition to office spaces for Contractor, Owner and Architect, space shall be provided for meetings capable of accommodating not less than 10, with appropriate furniture.
- b. Contractor's jobsite office shall be equipped with a telephone and facsimile. Cellular telephone only is not acceptable.

02 Contractor shall provide required sanitary facilities. Use of facility sanitary accommodations shall not be permitted. Clean, fresh drinking water shall be provided.

03 Contractor shall exercise necessary controls to minimize noise and dust during construction and in accordance with applicable regulatory requirements.

04 Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

05 Permanent elevator equipment may not be used for vertical transportation during construction.

06 Contractor shall provide 6'-0" high fence around construction site equipped with vehicular and pedestrian gates with locks.

07 Jobsite sign shall be provided in accordance with City of Glendale standards. Sign shall be plywood construction 8 feet wide by 4 feet high and shall include title of project and names of Owner, Architect, Engineer, and Contractor. No other signs are allowed without Owner's permission except those required by law.

01 60 00 Product Requirements

01 Proprietary specifications are not permitted, except as specifically approved or directed by City of Glendale project manager.

02 Substitution of materials and equipment by Contractor after start of construction shall be considered only under the following conditions:

a. Proposed substitution has been fully investigated and determined to be equal or superior to specified product.
b. Same warranty will be furnished for proposed substitution as for specified product.
c. Same maintenance service and source of replacement parts, as applicable, is available.
d. Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
e. Cost data included on the substitution request is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
f. Proposed substitution does not affect dimensions and functional clearances.
g. Payment will be made for changes to building design, including A/E design, detailing, and construction costs by the substitution.
h. Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

03 Consideration shall be given to materials that will reduce vandalism and graffiti.

04 Consideration shall be given to use of recycled products and use of materials which will minimize dumping.

01 70 00 Execution and Closeout Requirements

01 Project Record Documents: The Contractor shall maintain a complete and accurate record of changes or deviations from the Contract Documents and Shop Drawings, indicating the Work as actually installed.

02 The Architect shall provide the Contractor with a set of reproducible drawings, of the complete original bidding documents, at Contractor's expense. Contractor shall record changes on the drawings. Upon completion of the project, the record documents shall be turned over the owner.

03 Owner's Manual: Prior to final payment, Contractor submit three (3) hard-back, loose-leaf binders containing the following required submittals and any others required in other Sections, suitably typed, indexed and labeled for ready reference:

a. Subcontractors, major suppliers list with companies names, addresses and telephone numbers.
b. Warranties and certifications.
c. Affidavit from general and subcontractors on use of asbestos free materials.
d. Maintenance/operation instructions and parts lists.
e. List of Extra Materials supplied to Owner, signed by Owner's representative.
f. Other items required by the Specifications.
g. Electronic copy of documents on CD and/or DVD.

04 Operating instructions shall include complete operating sequence, control diagrams, description of method of operating machinery, machine serial numbers, factory order numbers, parts, tests, instruction books, suppliers phone numbers and addresses and individual equipment guarantees. Parts lists shall be complete in every respect, showing parts and part numbers for ready reference.

05 Upon completion provide CD or DVD disk(s) containing image copies in JPEG, PDF or other appropriate format of all record and maintenance documents.

01 80 00 Performance Requirements

01 90 00 Life Cycle Activities

DIVISION 02 - EXISTING CONDITIONS

02 01 00 Maintenance of Existing Conditions

01 Provision shall be made for protection of existing facilities and construction. Where existing sitework or facilities to remain in place must be disturbed in order to prosecute the work, such items shall be repaired or replaced as necessary to restore to prior existing condition.

02 20 00 Assessment

02 21 00 Surveys

01 Site surveys, including, if necessary, ALTA survey shall be provided by the consultant or by the City of Glendale as agreed in the consultant contract.

02 22 00 Existing Conditions Assessment

01 Site and surrounding area shall be examined to verify conditions impacting the work of the Project.

02 24 00 Environmental Assessment

01 Phase 1 and Phase 2 Environmental Assessments shall be conducted on city properties. These assessments include the outside of property and upon request non-scope items such as internal building assessments (lead, asbestos etc.).

02 25 00 Existing Material Assessment

02 26 00 Hazardous Material Assessment

01 Prior to start of work on existing facilities the Owner will engage a qualified testing laboratory to examine the site and the facility for the existence of hazardous materials (e.g., asbestos, PCB's, etc.). All such materials discovered will be abated prior to commencement of construction.

02 30 00 Subsurface Investigations

01 Owner will engage a geotechnical firm to perform subsurface investigations as necessary for design of the structure. Results of the investigations will be made available to consultants for design of the structure.

02 40 00 Demolition and Structure Moving

02 41 00 Demolition

02 41 13 Selective Site Demolition

02 41 16 Structure Demolition

02 41 19 Selective Structure Demolition

02 41 91 Selective Historic Demolition

02 42 00 Removal and Salvage of Construction Materials

01 Owner will designate materials, equipment, furnishings and other items in demolition area which are to be salvaged and turned over to Owner or suitably stored and reinstalled in new and/or remodeled structures. Otherwise, removal of salvage and construction materials is the responsibility of the contractor and shall be performed in a lawful manner.

02 42 91 Selective Historic Demolition

02 43 00 Structure Moving

02 50 00 Site Remediation

02 55 00 Remediation Soil Stabilization

02 56 00 Site containment

02 57 00 Sinkhole Remediation

02 60 00 Contaminated Site Material Removal

02 61 00 Removal and Disposal of Contaminated Soils

02 61 13 Excavation and Handling of Contaminated Material

01 If the soil contamination is a regulated waste, proper remediation, disposal and treatment may require oversight by regulatory agency.

02 65 00 Underground Storage Tank Removal

01 Underground storage tank removal must comply with all applicable regulatory agencies.

02 70 00 Water Remediation

02 80 00 Facility Remediation

02 81 00 Transportation and Disposal of Hazardous Materials

01 Transportation and disposal of hazardous materials must comply with all applicable regulatory agencies.

02 82 00 Asbestos Remediation

02 82 13 Asbestos Abatement

01 If appropriate to building age, Owner will engage a testing laboratory to investigate structures to be demolished.

02 Unless otherwise directed by the Owner, existing buildings or portions of buildings which are to be demolished and/or remodeled which have been found to have asbestos containing building materials (ACBM) will be abated under a separate contract with the Owner.

02 82 33 Removal and Disposal of Asbestos Containing Materials

01 Where required, removal and disposal of asbestos containing materials shall be in accord with federal, state and local laws and regulations.

02 83 00 Lead Remediation

02 83 19 Lead-Based Paint Remediation

01 Unless otherwise directed by the Owner, existing buildings or portions of buildings which are to be demolished and/or remodeled which have been found to have material containing lead will be abated under a separate contract with the Owner.

02 83 33 Removal and Disposal of Material Containing Lead

01 Where required, removal and disposal of material containing lead shall be in accord with federal, state and local laws and regulations.

02 85 00 Mold Remediation

02 85 33 Removal and Disposal of Materials with Mold

01 Where required, removal and disposal of material with mold shall be in accord with federal, state and local laws and regulations.

02 90 00 *Reserved - Not Used*

DIVISION 03 – CONCRETE

03 10 00 Concrete Forming and Accessories - Not used

03 20 00 Concrete Reinforcing - Not used

03 30 00 Cast-In-Place Concrete

01 Specify on-site mock up of all concrete work with finish appearance requirements

02 Fly ash: Not permitted in exposed concrete.

03 Portland cement: ASTM C150 Type II. From single supplier.

04 Vapor barrier under slab on grade: Minimum 15 mil polyolefin film.

05 Water/cement ratio: Not to exceed 0.45.

06 Exposed concrete floors shall be sealed to prevent staining of surface and powdering.

03 33 00 Architectural Concrete

03 37 00 Specialty Placed Concrete

03 37 13 Shotcrete

03 38 00 Post-Tensioned Concrete

03 40 00 Precast Concrete

03 41 00 Precast Structural Concrete

03 41 13 Precast Concrete Hollow Core Planks

01 Approved Manufacturers:
a. _____
b. _____

02 Manufacturer and Erector Certification: Qualified in accordance with PCI MNL-116 and PCI MNL-117, with a A1 and/or C2A certification as applicable.

03 Finish members to PCI MNL-116, Commercial grade where concealed, Finish A grade.

04 Erection tolerances: Erect units level within allowable tolerances of MNL-116. Variance in elevation between tops of installed adjoining units shall not exceed 1/2 inch. Units which exceed tolerance shall be removed and replaced with units meeting tolerance requirements.

03 41 33 Precast Structural Pretensioned Concrete

03 45 00 Precast Architectural Concrete

03 47 00 Site-Cast Concrete

03 47 13 Tilt-Up Concrete

01 Fly ash: Not permitted in exposed work.

03 50 00 Cast Decks and Underlayment - Not Used

03 60 00 Grouting - Not used

03 70 00 Mass Concrete - Not used

03 80 00 Concrete Cutting and Boring - Not used

03 90 00 Reserved - Not used

DIVISION 04 – MASONRY

04 01 00 Maintenance of Masonry

04 10 00 Reserved - Not used

04 20 00 Unit Masonry

04 21 00 Clay Unit Masonry

04 21 13 Brick Masonry

01 Specify ASTM C216 brick, Type FBX, Grade SW, unless otherwise approved by the Owner.

02 Anchors and accessories for face brick shall be galvanized or stainless steel.

04 22 00 Concrete Unit Masonry

01 Masonry Subcontractor shall have a supervisor on the jobsite, whenever masonry work is being performed, who is Certified by the Arizona Masonry Contractors Association. Proof of certification shall be submitted to the Architect prior to start of masonry work.

02 Certifications: Concrete masonry units shall be supplied by a manufacturer participating in the Certified Block Program of the Arizona Masonry Guild.

03 General Requirements for Concrete Masonry Walls:

a. Provide Standard Level workmanship as defined by AMG Standard 107, unless otherwise directed by Owner.

b. Concrete masonry units which will be exposed in the finished work shall be treated as an architectural finish and shall be handled carefully to ensure that chippages do not occur during handling and laying.

04 Mortar shall be Type S, 28 day strength of 1800 psi, unless otherwise required by design for al bearing walls. Grout shall have a minimum 28 day strength of 2000 psi.

05 All joints shall be pointed and tooled. No exposed flush joints allowed.

06 Masonry joints shall be caulked inside andout before additional wall finish materials are applied.

07 Reinforcing steel shall be inspected before any grouting to verify proper placement.

04 23 00 Glass Unit Masonry

04 40 00 Stone Assemblies

04 41 00 Dry-Placed Stone

04 42 00 Exterior Stone Cladding

04 43 00 Stone Masonry

04 50 00 Refractory Masonry - Not used

04 60 00 Corrosion-Resistant Masonry - Not used

04 70 00 Manufactured Masonry - Not used

04 80 00 Reserved - Not used

04 90 00 Reserved - Not used

DIVISION 05 - METALS

05 10 00 Structural Metal Framing

05 12 00 Structural Steel Framing

05 20 00 Metal Joists

05 21 00 Steel Joist Framing

05 30 00 Metal Decking

05 40 00 Cold-Formed Metal Framing

05 41 00 Structural Metal Stud Framing

05 42 00 Cold-Formed Metal Joist Framiing

05 50 00 Metal Fabrications

01 Walkways, canopies, railings and similar work shall be designed to not allow possible access by vandals, burglars, etc., to secure areas and rooftops.

05 51 00 Metal Stairs

05 52 00 Metal Railings

05 60 00 Reserved - Not used

05 70 00 Decorative Metal

05 71 00 Decorative Metal Stairs

05 73 00 Decorative Metal Railings

05 80 00 Reserved - Not used

05 90 00 Reserved - Not used

DIVISION 06 - WOOD, PLASTICS AND COMPOSITES

06 10 00 Rough Carpentry

06 11 00 Wood Framing

06 15 00 Wood Decking

06 16 00 Sheathing

01 For buildings with an estimated construction cost of $500,000.00 or more, or addition to a major building, provide an F.M. roof assembly, where roof sheathing shall be a minimum or 3/4" thick tongue and groove, fire treated plywood.

02 For buildings with an estimated construction cost of less than $500,000.00, roof sheathing shall comply with minimum Building Code requirements. Plywood deck clips are not permitted. Use only solid backing.

03 Gypsum board walls in corridors and heavy use areas shall have a 3/8 inch plywood backing and shall have solid blocking for all wall hung fixtures, doorstops, cabinets and similar items.

04 No oriented strand board (O.S.B.) will be permitted except for:
a. Under plastic laminate counter tops (O.S.B. must have a waterproof sealer.)

06 17 00 Shop-Fabricated Structural Wood

06 17 33 Wood I-Joists

06 17 36 Metal-Web Wood Joists

06 17 53 Shop-Fabricated Wood Trusses

06 18 00 Glued-Laminated Construction

06 20 00 Finish Carpentry

06 22 00 Millwork

06 25 00 Prefinished Paneling

06 30 00 Reserved - Not used

06 40 00 Architectural Woodwork

06 41 00 Architectural Wood Casework

06 41 13 Wood-Veneer-Faced Architectural Cabinets

06 41 16 Plastic-Laminate-Clad Architectural Cabinets

06 50 00 Structural Plastics - Not used

06 60 00 Plastic Fabrications

06 61 00 Simulated Stone Fabrications

06 61 13 Cultured Marble Fabrications

06 61 16 Solid Surfacing Fabrications

06 61 19 Quartz Surfacing Fabrications

06 70 00 Structural Composites - Not used

06 80 00 Composite Fabrications

06 82 00 Glass-Fiber-Reinforced Plastic

06 90 00 Reserved - Not used

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

07 10 00 Dampproofing and Waterproofing

07 11 00 Dampproofing

07 12 00 Built-Up Bituminous Waterproofing

07 13 00 Sheet Waterproofing

07 13 26 Self-Adhering Sheet Waterproofing

07 14 00 Fluid-Applied Waterproofing

07 14 13 Hot Fluid-Applied Rubberized Asphalt Waterpoofing

07 14 16 Cold Fluid-Applied Waterproofing

07 15 00 Sheet Metal Waterproofing - Not used

07 16 00 Cementitious and Reactive Waterproofiing

07 17 00 Bentonite Waterproofing

07 18 00 Traffic Coating

07 18 13 Pedestrian Traffic Coatings

07 18 16 Vehicular Traffic Coatings

07 19 00 Water Repellents

01 Clear repellents for masonry and concrete shall be silane or siloxane compounds (not a combination). The following are acceptable:

a. Silanes:
   1) Weather Seal SL100; ProSoCo, Inc.
   2) Regular or Super, Rainguard Products Company.
   3) Blok-Lok, Rainguard Products Company.
   4) Aqua-Trete,

b. Siloxanes:
   1) Prime A Pell H_2O; Chemprobe Technologies, Inc.
   2) WeatherSeal Siloxane WB; ProSoCo, Inc.
   3) Baracade ME; Tamms Industries Co.
   4) Diedrich 300-C, Diedrich Technologies, Inc.
   5) Micro-Seal Concentrate, Rainguard Products Company.

02 Warranties:

a. Manufacturer's warranty not less than 5 years from acceptance of project.

b. Applicator's warranty not less than 2 years from acceptance of project.

03 Testing: Upon completion the application shall be tested by a 4 hour water spray test. Evidence of penetration by water will require additional application of repellent material.

07 20 00 Thermal Protection

01 Building insulation shall be of type as suited to the construction and complying with code and other requirements. Exterior wall thermal resistance R-value shall be not less than 19 for walls and 38 for roofs.

07 25 00 Weather Barriers

07 30 00 Steep Slope Roofing

07 31 00 Shingles and Shakes - Not used

07 32 00 Roof Tiles

01 Clay or concrete, color and pattern as approved by Owner's project manger.

07 40 00 Roofing and Siding Panels

07 41 00 Roof Panels

07 41 13 Metal Roof Panels

07 42 00 Wall Panels

07 42 13 Metal Wall Panels

07 44 00 Faced Panels

07 46 00 Siding

07 50 00 Membrane Roofing

07 50 01 Roof Pads at Roof Equipment

01 Roof walk pads shall be on all sides of roof air conditioners with maximum distance between pads of 6".

07 51 00 Built-Up Bituminous Roofing

01 Specify 4 ply built-up roofing with mineral surface cap sheet. All roofing shall be UL or FMG Class A and shall comply with FMG Class 1-90 for blow-off resistance.

02 Roofing warranty shall be 20 years, unless otherwise directed by Owner.

03 Insulation (except where roofing is applied directly to the deck surface) shall be faced polyisocyanurate board type unless otherwise approved or directed by Owner. Minimum thermal resistance R-value of lay-up shall be 38.

04 Roofing to be applied over lightweight cementitious deck fill shall be warranted by the roofing system manufacturer for the entire assembly.

05 Roofing and base flashings at parapet or adjoining building walls shall extend up a minimum of 8 inches over 4 inch cant strips and shall be secured 6 inches on center at top.

07 52 00 Modified Bituminous Membrane Roofing

01 Mineral surfaced modified bituminous sheet system, not less than two plies. Hot mop, cold adhesive or torched application as approved by Owner. Cold applied system only (no torch down) over wood or plywood decks.

02 All roofing shall be UL or FMG Class A and shall comply with FMG Class 1-90 for blow-off resistance.

03 Acceptable manufacturers
- a. Johns Manville, Denver, CO (800) 654-3103 www.jm.com
- a. Siplast, Irving, TX (800) 922-8800. www.siplast.com
- b. Soprema, Wadsworth, OH www.soprema.com
- c. Tamko Asphalt Products, Joplin, MO (417) 624-6644 www.tamko.com

04 Roofing warranty shall be 20 years, unless otherwise directed by Owner.

05 Insulation (except where roofing is applied directly to the deck surface) shall be faced polyisocyanurate board type unless otherwise approved or directed by Owner. Minimum thermal resistance R-value of lay-up shall be 38.

06 Roofing to be applied over lightweight cementitious deck fill shall be warranted by the roofing system manufacturer for the entire assembly.

07 Roofing and base flashings at parapet or adjoining building walls shall extend up a minimum of 8 inches over 4 inch cant strips and shall be secured 6 inches on center at top.

07 53 00 Elastomeric Membrane Roofiing

01 EPDM and chlorosulfonated polyethylene (hypalon) roofs are not permitted.

07 54 00 Thermoplastic Membrane Roofing

01 PVC and Thermoplastic polyolefin sheets, both reinforced and unreinforced, for loose laid, adhered or ballasted installation. Use only if approved by Owner.

07 55 00 Protected Membrane Roofing

07 56 00 Fluid-Applied Roofing

07 57 00 Coated Foamed Roofing

01 Spray applied polyurethane foam with elastomeric protective top coating. Coated foam roofing is only recommended for certain limited conditions and types of installation and with attention to detailing.

07 60 00 Flashing and Sheet Metal

07 61 00 Sheet Metal Roofing

01 Standing or batten seam metal roofing system. Factory formed system. Minimum 24 gauge galvanized or aluminized steel.
- a. Finish: PVF (Kynar 500/Hylar 5000); 70% resin content.
- b. 20 year warranty on finish against fade, crack or peel.

02 Minimum slope of ½ inch per foot; 1/8 inch per foot in valleys.

03 Performance Requirements: Comply with the following:
- a. Water Infiltration: No measurable water penetration per ASTM E1646.
- b. Wind Uplift: UL580, Class 90.

04 Specify 20 year weathertightness warranty:
- a. Require manufacturer's written warranty for period of 20 years from substantial completion of the Work, on manufacturer's standard form in which manufacturer agrees to repair or replace sheet metal roofing as necessary to maintain roofing Work in watertight condition during the warranty period. Warranty to cover workmanship, materials and repair or replacement of same, at no cost to Owner.

05 Underlayment sheet:
- a. Rubberized asphalt (preferred): W.R. Grace "Vycor Ultra," Carlisle "Dri-Start HR," or approved equal.
- b. ASTM D226 No. 30 non-perforated asphalt saturated felts.

06 Insulation: Rigid insulation, if required, shall be felt faced isocyanurate board, thickness to provide required thermal resistance.

07 62 00 Sheet Metal Flashing and Trim

02 Minimum sheet metal thickness shall be 24 gauge for flashing. Use heavier gauges where appropriate.

01 Wrap all parapets to cap edge. Completely wrap interior parapets not visible to street level.

07 63 00 Sheet Metal Roofing Specialties

07 65 00 Flexible Flashing

07 70 00 Roof and Wall Specialties and Accessories

07 71 00 Roof Specialties

07 72 00 Roof Accessories

07 72 13 Manufactured Curbs

01 Roof Curbs for Mechanical Equipment
- a. *See figure #3*

07 80 00 Fire and Smoke Protection

07 81 00 Applied Fireproofing

07 84 00 Firestopping

01 Specify firestopping system tested and listed by U.L, Warnock Hersey or other approved laboratory to prevent the spread of fire, smoke and gasses through penetrations in fire resistive walls, floors and partitions, including; but not limited to; the following areas:
- a. Unprotected openings and openings accommodating penetrating items

such as cables, cable trays, pipes, ducts, boxes and conduits through fire rated floors, walls and smoke barriers.

b. Head of wall openings between wall and connecting floor or roof deck assemblies.
   a. Meet requirements for exposure to hose stream test.
   b. Applicable for use with steel fluted deck floor assemblies.
   b. Allow deflection of floor or roof above.

c. Openings at curtainwalls between exterior walls and connecting floor slab perimeters, equal to the fire resistance of the floor assembly.

02 Specify firestop systems acceptable to governing Code Authority from one of the following Manufacturers, subject to compliance with specified requirements:
   a. U.S. Gypsum Co. www.usg.com
   b. Johns-Manville www.jm.com
   c. Tremco, Inc. www.tremcosealants.com
   d. RectorSeal Corporation www.recotrseal.com
   e. 3M Fire Protection Products www.3m.com
   f. Specified Technologies, Inc. www.stifirestop.com
   g. HILTI Firestop Systems www.hilti.com
   h. Nelson Firestop Products www.nelsonfirestop.com
   i. Grace Construction Products – Flamesafe www.grace.com

03 Firestop System Materials - General:
   a. Appropriate for penetration.
   b. Include every component required for code approved installation, including; but not limited to:
      1) Firestopping putties or compound.
      2) Backing material.
      3) Wrap strips.
      4) Primers, clips and collars.
      5) Forming and damming materials.
      6) Sealant and solvent cleaner.

04 Properties:
   a. Free of asbestos, halogens and volatile components after curing and shall not slump or sag, (except for self-leveling products).
   b. Capable of maintaining an effective barrier against flames, heat and smoke in compliance with the requirements of ASTM E814, UL 1479 and U.B.C. Standard 7-5.
   c. Non-combustible per ASTM E 136.
   d. UV resistant where exposed to sunlight.
   e. Water resistant where exposed to moisture.
   f. Firestop system shall accommodate movement without adversely affecting fire rating of wall/floor assembly.
   g. Shrink resistant.
   h. Paintable or capable of receiving finish materials in those areas which are exposed to view and which are scheduled to receive finishes.

07 86 00 Smoke Seals

07 87 00 Smoke Containment Barriers

07 90 00 Joint Protection

07 91 00 Preformed Joint Seal

07 92 00 Joint Sealants

01 Specify field adhesion and stain tests and/or certified report from manufacturer.

a. Field Adhesion Testing: Perform preconstruction adhesion testing for each type of sealant and substrate as follows:

1) Arrange for manufacturer's field technical representative and Architect to be present during testing.
2) Install sealant in test joints in minimum 60 inch lengths.
3) Test joints by standard field adhesion hand pull test.
4) For joints with dissimilar substrates, test adhesion to each substrate separately as recommended by sealant manufacturer.
5) Conduct number of field adhesion tests for each type of sealant and each type of substrate as follows:
   a) Not less than 10 tests for the first 1,000 feet of installed sealant and 1 test for each additional 1,000 feet of sealant installed, or 1 test per floor per elevation.
6) Document results of field adhesion tests and record results in field adhesion test log.
7) Include in log data on pull distance used to test each joint sealant.
8) Include data on joints where material connected with pull portion of sealant failed to adhere to joint substrate or tore cohesively.
9) Inspect joints and record data for the following:
   a) Complete fill.
   b) No voids.
   c) Joint dimensions matching those of manufacturer's recommended details.
10) For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
11) Do not install joint sealants that fail to adhere to joint substrates during testing.
12) Repair sealant test areas by removing damaged materials and applying sealant to test area using same procedure used to originally install the sealant.

b. Stain Testing: Perform Stain testing of natural stone, masonry and other porous substrates proposed for use in the Work. Obtain actual samples of materials proposed for use and test to determine if permanent discoloration of porous surfaces will occur from direct contact with sealants. Perform stain testing in conformance with ASTM C1248 and as follows:

1) Notify Architect at commencement of stain testing procedure.
2) Arrange for manufacturer's field technical representative and Architect to be present during examination of test results.
3) Cut substrate to provide flat surface for application of sealant.
4) Separate substrate materials by removable shims to create 1/2 x 1/2 x 3 inch joint.
5) Fill joint with scheduled sealant, tool, and allow to cure for 21 days at room temperature.
6) After 21 day curing, remove shims, compress joint to 50 percent of original joint width to 1/4 inch, and place in an oven at 158 degrees F. for 14 days.
7) After 14 days in oven, remove and allow sample to cool to room temperature.
8) Examine sample to determine presence of discoloration or change in appearance in any way to exposed surfaces.
9) After visual inspection, cut sample in half to determine presence

of discoloration or change in appearance in any way into the sample itself at the adhesive bond line and presence of bleeding into the area around the adhesive bond line.

10) Document results of stain tests and record results in stain test log.

11) Do not install sealants that show evidence of staining substrates.

02 Warranties: Specify 20 year warranty for exterior sealants.

07 95 00 Expansion Control

DIVISION 08 - OPENINGS

08 10 00 Doors and Frames

08 11 00 Metal Doors and Frames

08 11 13 Hollow Metal Doors and Frames

01 Doors:
- a. Interior face sheets: 16 gauge
- b. Exterior face sheets: 14 gauge
- c. Stiffeners: 18 gauge continuous vertical formed steel sections, 6 inches apart, spot-welded to both face sheets 5" o.c.
- d. Vertical edges: 14 gauge channel with 1-inch legs, continuous weld.
- e. Tops and bottoms: Closed with 14 gauge continuous recessed steel channel, spot welded to face sheets. Provide flush closure at tops of exterior doors.
- f. Glass stops: Fixed moldings welded to door on security side. All stops 16 gauge.
- g. Louvers: Welded blade type construction, 14 gauge blades welded or tensioned to frame. Exterior doors shll have steel framed screens secured to back of louvers; wire screen shall be ¼" mesh galvanized hardware cloth.
- h. Hardware reinforcement: Door hinge and pivot 3/16" place lock face, flush bolts, closures 12 gauge sheet metal.

02 Frames:
- a. Interior and Exterior: 14 gauge steel.
- b. Construction: Welded units with integral stop and trim.
- c. Floor anchors: 14 gauge welded inside jamb.
- d. Jamb anchors:
  - 1) Masonry walls: Adjustable T-strap 2" x 10" x 14 gauge or 0.156 wire.
- e. Dust covers: 26 gauge
- f. Loose glazing stops: 16 gauge cold rolled steel.
- g. Hardware reinforcement: Frames hinge and pivot 3/16" plate. All other hardware 7 gauge steel sheet.

08 14 00 Wood Doors

08 14 16 Flush Wood Doors

01 Doors shall be 1-3/4 inch thick. Specify staved lumber core, except where mineral core is required for rated construction.

02 Obtain approval of Owner for use of mineral core wood fire rated door in lieu of metal.

08 20 00 Reserved - Not used

08 30 00 Specialty Doors and Frames

08 31 00 Access Doors and Panels

01 All access doors shall be metal and shall be fire rated as required. Provide access doors to attics, valves in walls or ceilings, roofs, crawl spaces, tunnels and similar spaces where City personnel must have access for maintenance or repair. Provide key locks on all access doors in public areas.

08 32 00 Sliding Glass Doors

08 33 00 Coiling Doors and Grilles

08 33 13 Coiling Counter Doors

08 33 16 Coiling Counter Grilles

08 33 23 Overhead Coiling Doors

08 33 26 Overhead Coiling Grilles

08 34 00 Special Function Doors

08 34 13 Cold Storage Doors

08 34 16 Hangar Doors

08 34 19 Industrial Doors

00 35 00 Folding Doors and Grilles

08 40 00 Entrances, Storefronts and Curtain Walls

08 41 00 Entrances and Storefronts

08 42 00 Entrances

08 42 26 All-Glass Entrances

08 42 29 Automatic Entrances

08 42 33 Revolving Door Entrances

08 42 36 Balanced Door Entrances

08 43 00 Storefronts

08 44 00 Curtain Wall and Glazed Assemblis

08 45 00 Translucent Wall and Roof Assemblies

08 50 00 Windows

08 51 00 Metal Windows

08 51 13 Aluminum Windows

08 52 00 Wood Windows

08 53 00 Plastic Windows

08 56 00 Special Function Windows

08 56 19 Pass Windows

08 56 53 Security Windows

08 56 59 Service and Teller Window Units

08 60 00 Roof Windows and Skylights

01 Skylights and roof top clerestories over interior spaces shall not be used on any City project, unless approved by the Project Manager.

08 62 00 Unit Skylights

08 63 00 Metal-Framed Skylights

08 70 00 Hardware

08 71 00 Door Hardware

01 Verify current allowable hardware types and manufacturers

02 Doors in fire rated corridors must be self-closing, latching and smoke sealed.

03 Exit devices required on rooms or areas with occupancy over 50.

04 Kick plates required on all doors.

08 74 00 Access Control Hardware

08 78 00 Special Function Hardware

08 80 00 Glazing

01 Exterior glazing shall be float, double pane insulated, low emissivity, with inert gas in void space.

02 Interior glass shall be accessible for cleaning while standing on the floor, i.e., no lifts needed.

08 90 00 Louvers and Vents

DIVISION 09 – FINISHES

09 10 00 Reserved - Not used

09 20 00 Plaster and Gypsum Board

09 21 00 Plaster and Gypsum Board Assemblies

09 21 13 Plaster Assemblies

01 Locate expansion joints as recommended by Industry standards, but not more than 10 feet on center, nor defining panels greater than 100 square feet.

02 Specify weather stops above exterior doors and windows.

09 21 16 Gypsum Board Assemblies

01 Gypsum board walls at corridor and heavy use areas shall be applied over 3/8-inch plywood (not oriented strand board - O.S.B.).

02 Gypsum board shall not be used as backing for ceramic tile.

03 Control joints shall be one piece type and shall be installed where needed but not more than 30 feet on center.

09 22 00 Supports for Plaster and Gypsum Board

09 22 13 Metal Furring

09 22 16 Non-Structural Metal Framing

01 Framing for Gypsum Board: Provide supplementary blocking for curtains and drapes at windows, for bathroom accessories and for doorstops.

09 22 26 Suspension Systems

09 23 00 Gypsum Plastering

09 25 00 Other Plasteriing

09 27 00 Plaster Fabrications

09 27 13 Glass-Fiber-Reinforced Plaster Fabrications

09 30 00 Tiling

01 Provide tile grout for floors in a color other than white or other light color.

02 Seal all grout.

03 4-1/4 inch wall tile is preferred in standard colors.

09 40 00 Reserved - Not used

09 50 00 Ceilings

09 51 00 Acoustical Ceilings

01 Exposed track shall be used for all 2 x 4 and 2 x 2 panels.

02 All tiles shall be flush with track, no reveal edges.

03 Use continuous patterns for future modifications.

04 Ensure fire rated tiles are clipped.

05 Pattern shall be selected from 3 most used fissured patterns.

09 54 00 Specialty Ceilings

09 60 00 Flooring

09 64 00 Wood Flooring

01 Wood floors shall be sealed with polyurethane or similar high performance finish for maintainability and long life.

02 Pretreat and provide barriers for pest control.

09 65 00 Resilient Flooring

01 Attic stock for tile flooring shall be not less than 1 box for each 30 boxes or fraction thereof for each type, color, pattern and size installed.

02 No sheet flooring or vinyl composition tile allowed in restrooms.

03 Specify Johnson's floor finish "Complete" or Butcher's Polish Co. "Beyond" for composition floors. Minimum of two coats to be applied and two coats of sealer, for a total of four coats. Allow for drying time of not less than 30 minutes between coats.

04 No pre-molded outside or inside corners for vinyl or rubber base.

09 66 00 Terrazzo Flooring

09 67 00 Fluid-Applied Flooring

09 68 00 Carpeting

01 Specify dense, low pile carpeting for wheelchair or cart traffic.

02 Specify multi-color weave to conceal soil.

03 Carpeting should have the following characteristics.

a. Four-color tweed pile
b. Tight loop pile
c. Continuous synthetic filament yarns.
d. Pile height approximately ¼-inch.
e. Impermeable backing membrane.
   (1) For slab-on-grade installations, verify that slab is suitably protected against moisture vapor emission which might cause loss of bond.

09 69 00 Access Flooring

09 70 00 Wall Finishes

09 72 00 Wall Covering

09 80 00 Acoustical Treatment

09 81 00 Acoustic Insulation

09 83 00 Acoustic Finishes

09 90 00 Painting and Coating

09 91 00 Painting

01 Specify scrubbable paint for interior surfaces.

09 96 00 High-Performance Coatings

09 97 00 Special Coatings

DIVISION 10 - SPECIALTIES

10 10 00 Information Specialties

10 11 00 Visual Display Surfaces

10 11 13 Chalkboards

10 11 16 Markerboards

10 11 23 Tackboards

10 11 33 Sliding Visual Display Units

10 12 00 Display Cases

10 13 00 Directories

10 14 00 Signage

10 17 00 Telephone Specialties

10 17 16 Telephone Enclosures

10 18 00 Informational Kiosks

10 20 00 Interior Specialties

10 21 00 Compartments and Cubicles

10 21 13 Toilet Compartments

01 Toilet partitions shall be floor mounted, overhead braced. Public areas shall be HDPE or approved polymer type.

02 Manufacturers:
a. Santana Products Co. www.santanaproducts.com
b. Capital www.capitalpartitions.com
c. Comtec Industries www.comtecindustries.com

03 Units shall comply with ADAAG.

10 21 16 Shower and Dressing Compartments

10 21 23 Cubicles

10 22 00 Partitions

10 22 13 Wire Mesh Partitions

10 22 26 Operable Partitions

10 26 60 Wall and Door Protection

10 28 00 Toilet, Bath and Laundry Accessories

10 28 13 Toilet Accessories

01 Specify accessories, including feminine products, as manufactured by Bobrick, unless otherwise approved by Owner.

02 No through-the-counter soap dispensers.

03 Verify whether Owner will supply soap and toilet paper dispensers. If to be provided by contractor, verify type to be specified.

04 Provide baby changing stations in restrooms and child care areas.

10 30 00 Fireplaces and Stoves

10 40 00 Safety Specialties

10 44 00 Fire Protection Specialties

10 50 00 Storage Specialties

10 51 00 Lockers

10 55 00 Postal Specialties

10 56 00 Storage Assemblies

10 56 13 Metal Storage Shelving

10 56 23 Wire Storage Shelving

10 57 00 Wardrobe and Closet Specialties

10 60 00 Reserved - Not used

10 70 00 Exterior Specialties

10 71 00 Exterior Protection

10 71 13 Exterior Sun Control Devices

10 73 00 Protective Covers

10 73 13 Awnings

10 73 16 Canopies

10 73 23 Car Shelters

10 73 26 Walkway Coverings

10 73 43 Transportation Stop Shelters

10 75 00 Flagpoles

10 80 00 Other Specialties

10 82 00 Grilles and Screens

10 90 00 Reserved - Not used

DIVISION 11 - EQUIPMENT

11 10 00 Vehicle and Pedestrian Equipment

11 11 00 Vehicle Service Equipment

11 12 00 Parking Control Equipment

11 13 00 Loading Dock Equipment

11 14 00 Pedestrian Control Equipment

11 15 00 Security, Detention and Banking Equipment

11 16 00 Vault Equipment

11 18 00 Security Equipment

11 20 00 Commercial Equipment

11 22 00 Refrigerated Display Equipment

11 23 00 Commercial Laundry and Dry Cleaning Equipment

11 30 00 Residential Equipment

11 31 00 Residential Appliances

11 40 00 Foodservice Equipment

11 50 00 Educational and Scientific Equipment

11 51 00 Library Equipment

11 52 00 Audio-Visual Equipment

01 Refer to Sec. 27 41 00, Audio-Video Systems

11 53 00 Laboratory Equipment

11 60 00 Entertainment Equipment

11 65 00 Athletic and Recreational Equipment

11 70 00 Healthcare Equipment

11 80 00 Collection and Disposal Equipment

11 82 00 Solid Waste Handling Equipment

11 90 00 Other Equipment

DIVISION 12 - FURNISHINGS

12 10 00 Art

12 10 01 Public Art

01 City of Glendale Code of Ordinances, Article VI. Public Art and Artistic Performances, Section 2-227 General Policy states as follows:

"The city accepts a responsibility for expanding experience through works of art and the performing arts. Such art has enabled people in all societies to better understand their communities and individual lives. The creation of works of art for public places and artistic performances in public places should be encouraged. A policy is therefore established to direct the inclusion of works of art in public works of the city and to encourage the performing arts within the city. (Ord. No. 1226, § 1, 4-12-83; Ord. No. 1629, § 1, 6-25-91)

02 Where public art is to be placed within the project, the design and provisions shall be such as to suitably accommodate the installation of works of art in accordance with this ordinance and as directed and approved by the City of Glendale.

03 Preservation of existing works of art owned by the city shall be in accordance with provisions of City of Glendale Code of Ordinances, Article VI. Public Art and Artistic Performances, Section 2-223. Art Preservation Fund.

12 20 00 Window Treatment

12 21 00 Window Blinds

12 22 00 Curtains and Drapes

12 24 00 Window Shades

12 30 00 Casework

12 31 00 Manufactured Metal Casework

12 32 00 Manufactured Wood Casework

12 34 00 Manufactured Plastic Casework

12 40 00 Furnishings and Accessories

12 50 00 Furniture

12 60 00 Multiple Seating

12 70 00 Reserved - Not used

12 80 00 Reserved - Not used

12 90 00 Other Furnishings

12 93 00 Site Furnishings

12 93 13	Bicycle Racks
01	Provide bicycle racks for every public building in accordance with City of Glendale standards.
12 93 23	Trash and Litter Receptors
12 93 33	Manufactured Planters

DIVISION 13 - SPECIAL CONSTRUCTION

13 10 00 Special Facility Components

13 12 00 Fountains

13 20 00 Special Purpose Rooms

13 30 00 Special Structures

13 40 00 Integrated Construction

13 50 00 Special Instrumentation

13 60 00 Reserved - Not used

13 70 00 Reserved - Not used

13 80 00 Reserved - Not used

13 90 00 Reserved - Not used

DIVISION 14 - CONVEYING EQUIPMENT

14 10 00 Dumbwaiters

14 20 00 Elevators

01 General
- a. Elevators shall be provided with a shunt trip switch.
- b. Buildings, which do not have a service elevator, should provide one elevator with removable ceilings and wall protection pads to allow it to be used as a service elevator when required.
- c. Elevators shall have 120-v outlet in car, 4' T-8 lights fixtures in car, and vandal resistant doors.

14 21 00 Electric Traction Elevators

01 Manufacturers
- a. Kone
- b. Mitsubishi
- c. Otis
- d. ThyssenKrupp

14 24 00 Hydraulic Elevators

01 Manufacturers
- a. Kone
- b. Otis
- c. ThyssenKrupp

14 30 00 Escalators and Moving Walks

14 31 00 Escalators

01 Manufacturers
- a. Kone
- b. Mitsubishi
- c. Otis

14 32 00 Moving Walks

14 40 00 Lifts

14 50 00 Reserved - Not used

14 60 00 Reserved - Not used

14 70 00 Turntables - Not used

14 80 00 Scaffolding

14 84 00 Powered Scaffolding

14 84 13 Window Washing Scaffolding

14 90 00 Other Conveying Equipment

14 92 00 Pneumatic Tube Systems

DIVISION 21 - FIRE SUPPRESSION

21 00 01 General

01 Fire Department Contractor's Guide: Refer to Section 01 10 13 for Fire Department Contractor's Guide, including requirements for inspection and testing of systems.

02 All fire suppression systems shall be designed by the Architect/Engineer of Record for the project, including all layouts. Installation drawings to be submitted for permit will be prepared by the installer.

21 10 00 Water-Based Fire-Suppression Systems

21 13 00 Fire-Suppression Sprinkler Systems

21 20 00 Fire-Extinguishing Systems

21 20 00 Fire Pumps

21 40 00 fire-Suppression Water Storage

21 50 00 Reserved - Not used

21 60 00 Reserved - Not used

21 70 00 Reserved - Not used

21 80 00 Reserved - Not used

21 90 00 Reserved - Not used

DIVISION 22 - PLUMBING

22 10 00 Plumbing Piping and Pumps

22 11 00 Facility Water Distribution

22 11 16 Domestic Water Piping

22 11 19 Domestic Water Piping Specialties

22 11 23 Domestic Water Pumps

22 12 00 Facility Potable-Water Storage Tanks

22 13 00 Facility Sanitary Sewerage

22 14 00 Facility Storm Drainage

22 15 00 General Service Compressed-Air Systems

22 20 00 Reserved - Not used

22 30 00 Plumbing Equipment

22 31 00 Domestic Water Softeners

22 32 00 Domestic Water Filtration Equipment

22 33 00 Electric Domestic Water Heaters

22 34 00 Fuel-Fired Domestic Water Heaters

22 35 00 Domestic Water Heat Exchangers

22 40 00 Plumbing Fixtures

01 Lavatories and showers in public facilities shall be equipped with devices, which limit the outlet temperature to a maximum of 105 F. Three-way tempering valves shall be used to maintain outlet temperature.

02 Water closets shall be wall mounted.

03 Urinals shall be wall mounted blowout types.

04 Sloan/Chicago valves

05 Flush valves for water closets and urinals should be those typically used in city buildings in order to keep inventories at a minimum.

06 Lavatories shall be wall mounted (low-flow), with four-inch centers, commercial style or equal, with self-closing valves or metering.

06 All floor drains located at lowest point in floor.

07 All restroom floor drains located at lowest point in floor.

08 Refer to Water Conservation Plumbing Fixture Ordinance, Sec. 9-35, for water-saving performance standards.

22 50 00 Pool and Fountain Plumbing Systems

01 Refer to Water Conservation Plumbing Fixture Ordinance, Sec. 9-35. Decorative fountains must be equipped with water recycling or reuse systems.

22 60 00 Gas and Vacuum Systems for :Laboratory and Healthcare Facilities - Not used

22 70 00 Reserved - Not used

22 80 00 Reserved - Not used

22 90 00 Reserved - Not used

DIVISION 23 - HEATING, VENTILATING AND AIR-CONDITIONING (HVAC)

23 00 01 Basic Materials and Methods

01 The provisions of these standards regulate the design of the mechanical and plumbing systems. Emphasis is to be placed on systems. Emphasis is to be placed on system efficiency, energy and water conservation, economy of maintenance, and utility expense to minimize life-cycle costs.

02 It shall be the responsibility of the consulting engineer to secure all as-built drawings and to make field inspections, as required, and to obtain all information needed for the work.

03 The design criteria shall be as outlined herein and convey only the end results desired. They are not intended to inhibit the consulting engineer from proposing alternate methods for achieving the same desired results.

04 Prior to the completion of a project, at least three sets of maintenance manuals, operating manuals, parts manuals, as-built and shop drawings of all equipment covered in this section shall be submitted to the city. The manuals for the HVAC controls will have all points documented and all control programming listed.

05 All installations shall be designed for total system efficiency and conservation. HVAC systems should be designed based on a life cycle cost analysis. A comprehensive energy analysis shall be performed for all buildings 10,000 sq. ft. or more, using computer simulation programs such as TRACE, DOE2, or others approved for use by the federal government. The computer simulation program shall be used to perform the energy analysis and evaluation of alternative building methods, materials, orientations, lighting and HVAC systems.

06 All systems shall be designed so that they are easily adaptable to the future growth of the facility.

07 All design considerations shall comply with ASHRAE standards.

a. Exterior design conditions
Outdoor design temperatures shall be:
Summer - 109 F Dry Bulb, 78 F Wet Bulb
Winter - 34 F Dry Bulb

b. Interior design conditions
Interior design temperatures shall be:
Cooling - 72 F Dry Bulb
Heating - 74 F Dry Bulb
Evaporative cooling - 1 air change/2 minutes

23 01 00 Operation and Maintenance of HVAC Systems

23 05 00 Common Work Results for HVAC

23 05 93 Testing, Adjusting and Balancing for HVAC

01 General

The testing and balancing agency (TAB) shall schedule their work to be completed during the time frame delineated on the project schedule. The TAB

agency will be required to coordinate their work with the general contractor and follow all safety procedures required on the project.

The TAB agency will be hired directly by the general contractor and subordinate to them. The TAB will not be part of the mechanical sub contractors bid.

02 Scope

This specification covers the system balancing of work done in other sections of the mechanical specifications. Also included are combined operating test and written reports.

Before final acceptance and after final adjustments have been completed, the systems shall be balanced and an operating test performed. The operating tests and training session shall not be performed until the Engineer has reviewed and accepted the test and balance report.

03 Intent

The intent of this specification is to establish that all components will perform as designed, and to obtain parameters up and downstream of each heat exchange device for use in establishing a heat balance and to test for sound transmission where necessary.

The representatives of the TAB agency who will be in charge of test and balance work and certification will be present at all required construction conferences, including the preconstruction conference, to meet with and discuss the project with the other subcontractors, owners, and design personnel.

This same representative must be available on the site when requested by the engineer to review job progress, establish damper locations, check duct pitot station locations, etc., and he shall prepare and submit reports as needed to keep all parties posted on the testing and balancing work progress related problems. Before final acceptance and after final adjustments have been completed and after the component check-out has been performed, the system shall be balanced. Balancing shall not begin until all systems including temperature control work, are completed and in working order.

Provide a joint and cooperative effort to coordinate the test and balance with mechanical subcontractor, electrical subcontractor, controls subcontractor, and general contractor, to solve (not just document) any problems in balancing and control interlocks in order to establish proper system performance before leaving the job and preparing the final test and balance report.

04 Equipment

The TAB agency shall provide not less than the following instruments and equipment for testing and balancing purposes.

Pitot tubes and draft gauges
Flow Hood, calibrated
Velometer, calibrated
Thermometers, mercury and bi-metallic stem types
Ampere-voltmeter
Speed Indicator

Octave Band Analyzer

05 System Performance Certification

The test and balance firm shall certify as to the performance of each mechanical system describing how each is operating. This is particularly important for safety systems such as smoke removal fans, smoke sensors, relief valves, etc. If the testing and balancing firm's investigation shows job deficiencies, these shall be corrected as necessary and the system retested at no additional cost to the owner.

06 Codes And Standards

Balancing shall be performed in accordance with AABC National Standards for Field Measurements and Instrumentation—Total System Balance, Volume One, No. 81266, as published by the Associated Air Balance Council.

07 Component Check-Out

Before system balancing is begun, a formal component check-out procedure will be performed in the presence of the engineer. The contractor or subcontractors will exercise each mechanical and electrical component installed to demonstrate the proper performance of these components.

All devices including those of the emcs system will be tested for proper function and written documentation of performance will be provided.

The TAB representative shall also be present at this checkout.

08 Air Handling Systems

The mechanical contractor shall place all systems in operation with all filters installed and automatic control systems completed and operating. The TAB agency shall temporarily load air filters by partially blanking or other approved means to produce air pressure drop midway between the clean and dirty conditions.

All fan units shall be tested and proved free from mechanical defects and to be in good operating condition. Air quantities handled shall be checked by measuring fan speed, fan discharge and suction pressure, duct pitot stations, etc. Grille discharge and return velocities shall be measured and tabulated with grille performance factor applied to show actual CFM handled versus specified CFM. All grilles, registers, and ceiling outlets shall be adjusted to provide correct throw, drop, and spread in the air stream to maintain draftless, comfortable conditions. The TAB agency shall also make such other tests as may be required to demonstrate that the air handling and air distribution equipment performance complies with the specification requirements. The air conditioning systems shall be balanced to provide even temperatures throughout the conditioned space for both heating and cooling, shall be checked by the TAB agency for both heating and cooling seasons. Upon completion, all tests, balancing, etc., the data herein requested shall be tabulated in a legible form in triplicate and submitted to the engineer a minimum of two weeks before final inspection. Main system air quantities shall be balanced to plus or minus 5% of CFM's specified; room grilles and registers may be plus or minus 10%, however, maintaining positive, neutral, or negative pressures as shown. Balance to assure proper flow as systems operate through economizer cycles. Submit (as part of report) duct layouts with

all test points noted and identified. Include on these plan sheets specific data to show where each pitot station is, access panel locations, etc. The contractor shall provide and install new sheave or sheaves, and new belts, as required, if a change in fan speed is necessary which cannot be made by adjusting the sheave originally installed.

09 Refrigerant Systems

General: Perform refrigerant system test after the piping system has been flushed out with nitrogen and completely cleaned.

Data: The following data shall be gathered after the refrigerant system has been tested:

Condensing unit and condenser manufacturer, Model No. nameplate serial number, unit size, tonnage, and fan CFM

Nameplate locked motor amps, running amps, horsepower, and voltage of the compressor and condenser motors

Measure and record the locked motor amps, running amps, horsepower, and the voltage on each leg of the compressor and condenser fan motors

Refrigerant suction and discharge pressure

Refrigerant suction and discharge temperature

Outside air wet bulb and dry bulb temperature during test

10 System Testing And Balancing Report

When installation has been completed, the TAB agency shall prepare a complete report, including design and final balanced conditions compared, including the following:

11 Test Reporting

Each sheet shall have the building name, the name of the installing contractor, the instruments used to perform the test, the name of the person performing the test, the date the testing was performed

All forms shall be a standard 8-1/2” x 11” good quality paper and bound together to form a complete report. All forms shall be typewritten or hand lettered; handwritten forms are not acceptable. Five (5) copies of the complete test and balance report shall be submitted to the engineer a minimum of two (2) weeks before the operating and maintenance instruction in accordance with Section 15010. One copy will be returned to the TAB agency with review comments.

The TAB agency shall include a typewritten report along with the bound test data. The report shall include discussions of the various systems along with listing specific deficiencies in the capacities or controlled environments as called for in the design, the apparent reasons or causes for each, and suggestions or recommendations for a course of action for correcting the deficiencies.

12 Air Handling Equipment:

Duct air volumes (supply, return, and exhaust) shall be adjusted to within 5% of design, and diffuser volume to within 10% before the following data is recorded. If equipment limitations seem to prohibit this adjustment, the contractor shall request instructions from the engineer. Measure and record fan air delivery, pressures, etc. on low and high speed operation.

Size, type, and manufacturer of diffusers, grilles, registers, air terminal units, and all tested equipment shall be identified and listed. Manufacturer's ratings on all equipment shall be used to make required calculations.

In cooperation with the control manufacturer's representative, setting adjustments of automatically operated dampers to operate as specified, indicated, and/or noted. Testing team shall check all controls for proper calibrations and list all controls requiring adjustment by control installers. All tight closing dampers shall be tested for leakage.

As a part of the work of this contract, make any changes in the pulleys, belts, and dampers or the addition of manual balancing dampers required for correct balance at no additional cost.

Fan make, model, size, serial number, and equipment schedule number

Fan motor nameplate, horsepower, amperage, and voltage

Fan motor running amperage and voltage

Fan RPM

A pitot tube traverse of all mains and branch ducts indicating delivered air quantities. Where pitot tube traverse is not practicable, other methods of testing airflow may be used if approved.

Air pressure drop analysis across each fan system component, including coil air pressure drop, air washer pressure drop, filter pressure drop, scrubber pressure drop, total fan static pressure.

CFM of fresh air intake (maximum and minimum setting) at high speed and low speed operation, and for all supply air flow measurement increments required for variable flow systems.

13 Sound Testing (Optional)

Perform and record required sound measurements when directed by the engineer. Take readings in rooms, approximately ten percent of total rooms, designated by the engineer.

Take measurements with a calibrated south level meter and octave band analyzer of the accuracy required by AABC or NEBB.

Sound reference levels, formulae and coefficients shall be according to ASHRAE Handbook, 1984 Systems Volume, Chapter SOUND AND VIBRATION CONTROL.

General Measurement Procedures:

Reduce the background noise as much as possible by shutting off unrelated audible equipment.

Measure octave band sound pressure levels with specified equipment “off”.

Measure octave band pressure levels with specified equipment “on”.

Use the DIFFERENCE in corresponding readings to determine the sound pressure due to equipment.

DIFFERENCE:	0	1	2	3	4	5-9	10 or more
FACTOR:	10	7	4	3	2	1	0

Sound pressure level due to equipment equals sound pressure level with equipment “on” minus FACTOR.

Plot octave bands of sound pressure level due to equipment for typical rooms on a graph, which also shows, noise criteria (NC) curves.

For outdoor equipment: Use directivity factor and distance from noise source to determine distance factor, i.e., difference between sound power level and sound pressure level. Measured sound power level will be the sum of sound pressure level due to equipment plus the distance factor.

Where sound pressure levels are specified in terms of dbA, measure sound levels using the “A” scale of meter. Single value readings will be used instead of octave band analysis.

Where measured sound levels exceed specified level, the installing contractor or equipment manufacturer shall take remedial action approved by the engineer and the necessary sound tests shall be repeated.

For substitute equipment, which has no sound power ratings, scheduled on the plans, the contractor shall select equipment to meet local ordinance levels, and OSHA requirements. Selection procedure shall be in accordance with ASHRAE 1984 Systems Handbook, Chapter 32, SOUND AND VIBRATION CONTROL. An average value of 5db shall be used as the room attenuating effect, i.e., the difference between sound power levels emitted to room and sound pressure level in room.

In absence of specified measurement requirements, measure equipment noise levels three feet from equipment and at an elevation of maximum noise generation.

23 07 00 HVAC Insulation

23 07 13 Duct Insulation

23 08 00 Commissioning of HVAC

23 09 00 Instrumentation and Control for HVAC

01 Disconnects For All Air Conditioning Units And Evaporative Coolers

a. Shall be knife-switch, fused or non-fused type.

1). Voltage & Amperages recommended by manufacturer.

b. Shall be of lever type, rain tight.
c. Shall not be mounted on any removable panel of the unit itself.
d. Shall not cover or obscure unit data plates.
e. Shall not cover any part of outdoor coil.
f. The disconnect or any wiring associated with disconnect shall not block or restrict any panel access or filter access.

02 Air conditioning units and their associated thermostats shall be identified with corresponding numbers.

03 Numbers on outdoor units to be stencil painted using paint color, which contrasts to unit color.

04 Numbers shall be 2" in size.

05 Corresponding thermostat to have like number on 1/2" X 1" brass tag below thermostat, secured to wall with screws.

06 Numbering system shall be:

1st Unit - PKG – 01, 2nd Unit - PKG – 02, etc. for all remaining units.

07 Thermostats:
a. No programmable thermostats on any 24 hours City of Glendale Facility.
b. Use Honeywell T87F Mechanical thermostats on all single stage systems.
c. Use Honeywell T874 Mechanical thermostats for all multistage systems.
d. All thermostat wire to be minimum 18 AWG copper - 8 conductor.
e. Thermostat wiring I all interior or exterior walls shall be on EMT Stub to 8" above drop ceiling.
f. Any area with hard pan ceiling shall have EMT extended to accessible drop ceiling area.
g. All thermostat exterior runs shall be in EMT with maximum 5' liquidtite type flex connection to package unit minimum size conduit 3/4".
h. All thermostat wires will be 1 continuous run between unit and thermostat. No splices.
i. All Air conditioning units will have a discharge air thermostat wired series with the low voltage conditioned space thermostat.
j. Use RANCO # ETC 112000-000.
k. Mount this accessory in the Unit Manufacturers Control Box.

23 10 00 Facility Fuel Systems

23 20 00 HVAC Piping and Pumps

23 21 00 Hydronic Piping and Pumps

01 Pumps: System pumps will be Bell and Gosset, Taco, or Peerless.

23 22 00 Steam and Condensate Piping and Pumps

01 Condensate Lines and Cooler Drains
a. Minimum size 3/4"
b. All lines to be type M hard drawn copper sloped 1" per 8' towards drain supported every 6' O.C.
c. No dips or sags, no wood blocks for support on exposed roof areas.

d. Condensate line to have copper trap and vent (vent located down stream from trap) with copper union between trap and vent.
e. No condensate line shall restrict access to any unit panel or filter access or working space to service the unit.
f. Condensate lines in a ceiling space will be entirely insulated.
g. Hose Bibb
   1) All air conditioning units to have a hose bib (supplied by 1/2 I.D. copper line) within 40' of all roof units. Line side shut off ball valve for a hose bib at main line tee.

23 23 00 Refrigerant Piping

23 25 00 HVAC Water Treatment

23 30 00 HVAC Air Distribution

01 Central air distribution is to accomplish by variable air volume systems with variable fan speed rather than constant volume systems for the same system static pressure. This approach reduces energy use during part load conditions and takes advantage of each zone's operational characteristics.

02 Consider economizer cycle (free cooling) by using "plate & frame" heat exchanger for systems with cooling tower capacity exceeding 100 tons and energy management and temperature control system (EMTCS) for automated valve control.

03 Chiller systems will have a bypass valve controlled by head pressure for low temperature operations. No 100 percent shut-off valves for condenser water control will be allowed.

04 Avoid multi-zoned packaged air conditioning units.

05 Evaporative cooling shall be evaluated and installed where practical. Evaporative coolers shall utilize Celdek/Glasdek pad media, or approved equal, with a minimum thickness of 8 inches.

06 Air Distribution System
a. Air shall be supplied to the occupied space by low-velocity ducts.
b. To minimize air circulation fan horsepower, ductwork shall be designed for the lowest practical total pressure drop.
c. Refer to Div. 27 for cooling of telecommunication rooms.
d. Refer to Div. 26 for cooling of electrical rooms.

23 30 01 Air handlers, Fan Coils, and Variable .Air Volume Terminals

01 Provide isolation valves for each. If fan motors are provided they shall be direct drive. Air handlers for V.A.V systems shall have variable frequency drives. Sheaves and pulleys shall be of the fixed variety.

02 Environmental Technologies products are not acceptable

23 31 00 HVAC Ducts and Casings

01 Duct Work, Velocity, Lining: All duct sizing, gauge, supports, and turning vanes shall comply with the newest SMACNA specifications.

02 Maximum length of any flex duct at supply or return registers shall be 5'.

03 No flex duct can be used at any other point in duct system. Only multi-layered flexible foil duct with metalized jacket can be used.

04 Flex duct shall be attached using minimum 4 teck screws to attach inner lining spiral to collar and vinyl band around insulation and jacket.

05 All returns to be ducted back to air conditioning unit.

06 Balancing damper to be installed at every supply run take off - all dampers to be accessible above suspended ceiling.

07 All supply registers to be high volume step down diffusers.

08 Hart & Cooley 5400 Series with butterfly damper.

23 32 00 Air Plenums and Chases

23 33 00 Air Duct Accessories

23 33 13 Dampers

23 33 19 Duct Silencers

23 34 00 HVAC Fans

23 35 00 Special Exhaust Systems

23 36 00 Air Terminal Units

23 36 13 Constant-Air-Volume Units

23 36 16 Variable-Air-Volume Units

23 37 00 Air outlets and Inlets

23 37 13 Diffusers, Registers and Grilles

23 38 00 Ventilation Hoods

23 38 13 Commercial-Kitchen Hoods

23 40 00 HVAC Air Cleaning Devices

23 41 00 Particulate Air Filtration

23 41 13 Panel Air Filters

01 Only disposable paper filters with 1" or 2" nominal thickness can be used.

02 Only standard sizes are acceptable: no special order or custom size

03 All filters will be in air conditioning unit if designed by Equipment Manufacturer for filter racks.

04 On equipment without filter racks provided by Equipment Manufacturer, a separate filter section shall be added adjacent to the unit at return air.

05 This filter section will be equipped with separate door and latch (such as Eco Air surepleat single stage side access filter housing).

06 On the date of occupancy by City of Glendale the HVAC contractor will change all filters installing new Eco Air C35H pleated filters or equivalent.

07 No filter door or access panel shall have conduits, piping or other restrictions placed on it so as to prevent removal.

23 50 00 Central Heating Equipment

23 51 00 Breechings, Chimneys and Stacks

23 52 00 Heating Boilers

23 52 00 Heating Boiler Feedwater Equipment

23 54 00 Furnaces

23 55 00 Fuel-Fired Heaters

23 56 00 Solar Energy Heating Equipment

23 57 00 Heat exchangers for HVAC

23 60 00 Central Cooling Equipment

23 60 01 General

01 All air conditioning equipment will have EER's of 10 or higher certified by A.R.I.

02 In large systems (10 tons or more), utilize several smaller units. No roof mounted multi-zone units

03 In larger systems (100 tons or more), when a single unit is called for, utilize high-efficiency, multiple-compressor, water-cooled chiller.

04 Under no circumstances will systems utilizing water source heat pumps (“California heat pumps”) be permitted

05 Component Standards: All equipment to be rated at Air Conditioning and Refrigeration Institute's (ARI) conditions.

06 Unitary air conditioners and heat pumps should be selected based on SEER (units less than 5.4 tons) and EER (units over 5.4 tons) ratings. SEER rating should be a minimum of 14 and EER rating should be a minimum of 12. (Maximum ratings are the preference)

07 Chillers should utilize HFC refrigerants. Chillers should not exceed consumption of 0.56 kw/ton (100% full load in accordance with ArI standards).

08 All electric motors exceeding 1,00 operating hours annually shall be energy efficient and shall have minimum acceptable nominal efficiency for single speed motors as specified below. Energy efficiency rating must be made using testing methodology IEEE-112, Test Method B.

HP	Min. Rated Eff (%)
84.0%	
89.5%	
91.5%	
92.8%	
50-99	94.1%
94-5%	
125 & Greater	95.0%

09 Placement of Equipment: To minimize safety hazards and to provide for ease of accessibility for maintenance and repair, major air conditioning and hearing equipment components (compressors, air handlers, heaters, etc.), shall not be located in areas immediately above hard ceilings. If design suggests that major equipment be located in hard ceiling areas, approval of the Building Standards Committee is required. In all cases, an adequate work platform shall be provided for maintenance functions.

10 Roof-mounted equipment must be curbed. Safe access must be provided for all roof-mounted equipment.

11 Equipment may not be placed in a space in such a manner that the maintenance, repair or removal of the equipment requires alteration to a doorway, roof, ceiling, floor, wall or adjacent equipment.

12 Multi-storied facilities shall be designed with a minimum of one air handler per floor.

13 All roof mounted equipment shall be screened in accordance with city code.

23 61 00 Refrigerant Compressors

23 62 00 Packaged Compressor and Condensor Units

23 62 01 Small Tonnage Units

01 Package Air Conditioning or split system Units are the only acceptable heat/cool system for small tonnage applications

02 These units shall be either:
a. Electric cool/gas heat
b. Electric cool/electric resistance heat

03 Electric heat pumps (may have supplemental resistance heat)

04 Only Trane, American Standard, or Carrier are acceptable unit manufacturers.

05 Only new undamaged units are acceptable. The Contractor will replace (not repair) any unit with extensive coil damage (more that 10% of the fins bent, torn, or obstructed) or bent panels, which are a part of the indoor or outdoor coil structure. Any other panels, which can be

independently replaced, will be replaced with new manufactured supplied panels.

06 All units shall be visibly level with a 1/4" per foot slope towards condensate drain.

07 All units shall come with 2-year parts and labor warranty - 5 year extended on the unit's compressor. Warranty to begin at building completion and acceptance by City of Glendale and Facilities Management. No earlier than issuance of the Certificate of Occupancy. All service calls under this warranty are to be on a NO COST BASIS including all parts, equipment, and materials (including refrigerant) necessary to return unit to manufacturer's new operating conditions.

08 Extended warranty options will be made available for all equipment

09 Refrigerant acceptable: R22

10 All sides of package unit will have a minimum of 3' clearance from any other unit, or building wall, structural element or decorative treatment. No parapet walls will be allowed to enclose the roof area if roof mounted air conditioners are used.

11 There shall be NO restrictions to discharge air from outdoor coil, no walls, bars, trusses, rods, screens, covers, or any other device, which in the opinion of City of Glendale staff can cause loss of unit performance.

12 In the event that original MFG unit color is unsatisfactory for any reason NO PAINT or OFF SPRAY shall be applied to outdoor coil.

23 63 00 Refrigerant Condensers

23 64 00 Packaged Water Chillers

01 Chilled water systems

a. The Chillers will be screw type manufactured by Trane or Carrier. No York or Mcquay. The Towers or fluid coolers will be Baltimore Air coil, Marley, or Evapco stainless steel. Towers or fluid coolers will not be installed in any type of enclosure that restricts access or airflow. All piping around this or any other equipment will not be installed in a manner that access to the tower, or equipment around the tower, will be under or over said piping.

b. The City of Glendale uses W.E.S.T. as the water treatment provider. We would prefer them, and suggest their use for system cleaning and start up. If any other contractor is used, Facilities Management will be notified and given the opportunity to be present to observe this process.

23 65 00 Cooling Towers

23 70 00 Central HVAC Equipment

23 71 00 Thermal Storage

23 72 00 Air-to-Air Energy Recovery Equipment

23 73 00 Indoor Central-Station Air-Handling Units

23 74 00 Packaged Outdoor HVAC Equipment

23 75 00 Custom-Packaged Outdoor HVAC Equipment

23 76 00 Evaporative Air-Cooling Equipment

01 Use only Master Cool II Units up to 10,000 CFM.

02 Over 10,000 CFM single or double sided Celdek Coolers only.

03 NO Stainless Steel Coolers.

04 All copper supply lines minimum 1/2" ID with ball valve shut off adjacent to cooler.

05 There will be hose bibs and convenience receptacles installed for maintenance purposes close to all roof mounted units. A/c or evaporative coolers

06 All copper drain lines - (see condensate and cooler drains).

07 Coolers shall be warranted for 2 years parts and labor.

08 All service calls done under this warranty are to be on a NO COST BASIS.

09 *See figure #4.*

23 80 00 Decentralized HVAC Equipment

23 81 00 Decentralized Unitary HVAC Equipment

23 82 00 Convection Heating and Cooling Units

23 83 00 Radiant Heating Units

01 Bay Infared Heating Equipment

23 84 00 Humidity Control Equipment

23 90 00 Reserved - Not used

DIVISION 25 - INTEGRATED AUTOMATION

25 10 00 Integrated Automation Network Equipment

25 20 00 Reserved - Not used

25 30 00 Integrated Automation Instrumentation and Terminal Devices

25 35 00 Integrated Automation and Terminal Devices for HVAC

01 Each facility shall be designed with a control system for maintaining tenant comfort and minimizing energy consumption. Control systems will vary depending on size and type of facility.

02 Energy management and temperature control systems (EMTCS) with DDC control shall be used on all large facilities (40,000 sq. ft. and above). EMTCS shall be flexible in controlling various areas of the facility and shall be equipped with manual overrides for after hour use by the tenants. Overrides shall be readily accessible and should control areas based on a color-coded sectioned map of the facility. Overrides must be capable of being programmed remotely by facilities management staff for user accessibility. Consult with Facility Maintenance & Energy Management Section as to type of system for compatibility with current EMTCS.

03 Energy management systems (EMS) shall be used on medium size facilities for control of HVAC and lighting loads. These facilities will range from 10,000-sq. ft. to 39,000 sq. ft. Overrides shall be readily accessible and should be located next to existing thermostats for after hour use by the tenants. Consult Facility Maintenance & Energy Management Section as to type of system for compatibility with existing EMS. If facilities in this range require temperature control, the EMTCS will be installed per EMTCS specifications above.

04 Smaller facilities up to 10,000-sq. ft. where the primary concern is control of HVAC units, programmable thermostats shall be specified with built-in push button overrides.

05 The EMTCS and EMS shall control the lighting circuits of the facility as well. A separate lighting control system shall not be specified.

25 36 00 Integrated Automation Integration and Terminal Devices for Electrical Systems

01 The EMTCS and EMS shall control the lighting circuits of the facility as well. A separate lighting control system shall not be specified.

25 40 00 Reserved - Not used

25 50 00 Integrated Automation Facility Controls

25 60 00 Reserved - Not used

25 70 00 Reserved - Not used

25 80 00 Reserved - Not used

25 90 00 Integrated Automation Control Sequences

DIVISION 26 - ELECTRICAL

26 00 01 Basic Materials and Methods

01 General

Design the Electrical systems for compliance with local, State and National Codes, laws, regulations, standards etc. Require the Contractor to install the electrical systems to these same codes, laws, regulations, standards etc.

Systems drawn on floor plans shall have room designations and numbers on the electrical drawings themselves, so that it is clear which room is being provided with power, lighting, communications, etc.

Electrical site plans shall show outside connections to utility or other service suppliers, such as power, telephone and other communications, fire alarm, security and other special systems. Show locations of points of connection to the service provider such as distribution transformers.

The fire alarm system is the responsibility of the electrical consultant.

On projects without an energy management system, the electrical consultant will show power and controls conduit and wiring to electrically operated thermostats, from the thermostat to the control equipment and between the control equipment and the mechanical equipment.

Evaluate circuits for total harmonic distortion (THD) if they are known to be supplying equipment such as fax machines, printers, computers, copiers, electronic ballast's, etc. Design for a maximum of six (6) receptacles on one 20-Amp circuit known to be feeding these types of loads. No more than one (1) printer per "PC" computer on circuits with more than one receptacle. For circuits feeding only computers, design with 200% neutrals and isolated grounds.

Each branch circuit for power of computer systems shall have a dedicated neutral.

In new facility or major remodel building projects, design 20-Amp, 120-Volt branch circuits with isolated grounds. Require and design for the necessary transformers, panelboards and other equipment to be included to provide a true isolated ground system.

When designing modifications of existing facilities, design, material and workmanship should be consistent with the quality established in the existing facility, however, in no case should the new installation's design, material or workmanship be of less quality than that established in these standards.

All electrical work must meet the requirements of the Glendale City Code. All projects require a city building permit.

The provisions of these standards regulate the design of electrical systems. Emphasis is to be placed on system efficiency, energy conservation, economy of maintenance, and utility expense to minimize life-cycle costs.

It shall be the responsibility of the consulting engineer to secure all as-built drawing and to make field inspections, as required, and to obtain all information needed for his/her work.

The design criteria shall be as outlined herein and convey only the end results desired. They are not intended to inhibit the consulting engineer from proposing alternate methods for achieving the same desired result.

Prior to the completion of a project at least three sets of maintenance manuals, operating manuals, parts manuals, as-built and shop drawings of all equipment covered in this section shall be submitted to the city.

Architect/engineer shall review design with city representatives, including the Building Standards Committee, at 30% and 60% of completion.

All systems shall be designed so that they are easily adaptable to the future growth of the facility.

All design considerations shall comply with ASHRAE standards.

Minimum size wire for lighting and power branch circuits shall be #12 AWG copper

All branch Circuit conductors shall be 75 C THHN/THWN 600 V copper

All panelboards, switches, motor starters and switchboard circuit breakers shall have engraved micarta nameplates.

Design the transformer to have adequate cooling space on all sides. Design to comply with NEC 450-9 and other applicable instructions or guidelines for transformer cooling. Consult with the Mechanical Engineer to determine if cooling air must be directed into the Electrical Closet to provide adequate cooling for the electrical equipment.

Use dry-type transformers when changing voltage from 480-volt systems to 240, 208-volt systems, or similar transformations in systems operating at less than 600 volts.

Require the Contractor to measure and adjust as required the secondary voltage at the secondary terminals of each transformer supplied by the project. Require adjustment to within +/- 2% of the nominal system voltage using the transformer taps. Require the measurements be made under expected maximum demand conditions or as close to expected maximum demand as possible.

The electrical contractor is responsible for the provision and installation of all AC power circuits, wiring, conduit, wall boxes, pull boxes, junction boxes, outlets, power panels (including sequencing power panels when specified) and electrical wire-ways for lighting distribution and control lines- for Theatrical Lighting, Audio/Visual and Projection systems.

The electrical contractor is responsible for the interconnection of power to the sound equipment racks, the lighting dimmer racks, installation and termination of dimmer racks and lighting distribution circuits.

The Audio/Visual or Theatrical Contractor shall supply any custom boxes, floor boxes and ceiling speaker back-boxes for installation by the electrical contractor.

02 Electrical Equipment

All equipment and accessories specified shall be new and must be approved by at least one of the following testing laboratories of City of Glendale, Building Safety Department.

Underwriters Laboratories Inc. (UL)
Factory Mutual (FM)
ETL Electrical Testing Laboratories (ETL)
MET Electrical Testing Co. Inc. (MET)
Applied Research Laboratories (ARL)

Other Standard/Testing Laboratories, which can document that they are reciprocal with any of the above listed laboratories.

03 Grounding

Install a GREEN Equipment Grounding Conductor in each conduit.

26 05 00 Common Work Results for Electrical

26 05 11 Wiring Methods

26 05 13 Medium Voltage Cables

01 Wire And Cable

Design for all wire and cable to be installed in a continuous raceway listed for the intended use. Cable tray is acceptable for communication cable.

Require lighting and power branch circuit conductors to be a minimum of #12 AWG copper conductor with 98% conductivity. Stranded conductors may be used for No. 8 AWG and larger.

Require continuity and insulation testing on all feeder and branch circuit conductors. Insulation testing shall be performed with a 500 VDC megger. Phase and neutral conductors shall test free of short-circuits and grounds. For continuity testing, motor feeders shall be measured with motors connected and local disconnect closed; readings shall be one phase-to-ground for each phase. Test all other conductors phase-to-phase and phase-to-ground.

Require testing of proper phase rotation for three phase systems. Require individual tests at the service entrance, motor control centers and any other sources that feed equipment that may be adversely affected by incorrect phase rotation, especially rotating machines.

Require that the contractor furnish the instruments, materials, and labor for all tests at no additional cost to the owner (i.e., must be part of the bid price). Require the contractor present to the Owner three copies of certified test reports. In addition to the various electrical measurement results, the test reports shall, at a minimum, include the official project name, the project address, building number, name of the test, name of the equipment tested, location in the building of the equipment tested, project General Contractor, Contractor performing the test, Contractor's employee performing the test, date, time, and temperature. The city expects the test result to be reported in a reasonable, easily read format and expects the use of good common English, accurate spelling and good penmanship in the reports. The city reserves the right to reject test reports that

are difficult to interpret. This does not exclude using narratives to explain test reports, methods and unusual field circumstances that may contribute to difficult testing situations.

26 05 26 Grounding and Bonding for Electrical Systems

01 Grounding and Surge Protection Specification

GROUNDING AND SURGE PROTECTION

PART 1 - GENERAL

1.1 SYSTEM DESCRIPTION

A. Furnish all materials and labor necessary to complete the installation of specific systems described herein and integration of all systems as indicated, specified herein or both. The work includes the following, as well as work not listed below but described elsewhere:

1. Surge Protectors.
   a. Protection of exterior power circuits including installations on the building facade.
   b. Protection of exterior data circuits, including installations on the building facade.
   c. Protection of exterior signal circuits, including installations on the building facade.
   d. Protection of power circuits entering equipment cabinets.

2. Surge Protection
   a. All Division 27 metallic data lines entering or leaving a building shall be protected with surge protection devices. This specification also applies to field devices mounted on the exterior façade of the building.
   b. Grounding of protective devices shall be in accordance with the manufacturer's recommendations and/or as described in these specifications and drawings.
   c. Devices shall be mounted to the back panel of the cabinet. Provide separate enclosure for all surge protection devices mounted in equipment cabinets.

3. Ground and Bonding
   a. Provide Telecommunications Main Grounding Busbar (TMGB), Telecommunications Bonding Backbones (TBB), Grounding Equalizers (GE) and Bonding Conductor for Telecommunications as indicated in Project Documents.
   b. It shall be the responsibility of this contractor to ensure that the telecommunication grounding system for this facility is continuous, complete, and meets all applicable codes and standards.

4. Back Up Power
   a. All equipment, except inductive loads (jamb mounted solenoid locks, etc.) shall be powered by an un-interruptible power supply (UPS).

B. System Configuration

1. All surge protection devices will be located in the main equipment room.

2. A true online UPS power supply is required.

PART 2 - PRODUCTS

2.1 SURGE PROTECTION

A. General

1. All surge protection devices shall have the lowest surge voltage rating per U.L. 1449 that is consistent with the line levels.

2.2 POWER LINE SURGE PROTECTION

A. Specifications

1. Load Rating: 20 amps at 120 volts
2. Limiters: Series surge reactor current limiter. Cascaded auto-tracking dual polarity voltage limiter. Dual pulse inverters.
3. Clamping Voltage Onset: 172 volts nominal (2 volts above peak line voltage, auto tracking)
4. Filter: With 50 ohm load: 3 dB @ 3 kHz; 38 dB @ 100 kHz; 50 dB @ 300 kHz; 50 dB @ 5 MHz; 50 dB @ 30 MHz.
5. Let-Through Slew Rate: 5000 volt/us disturbance reduced to 28 volts/us within power wave envelope; less than 10 volts/us outside power wave envelope.
6. Snubber: Instant reacting snubber for fast-rising surges generated within the building.
7. Max Applied Surge Pulse Voltage: 6000 volts (1.2 x 50 us pulse)
8. Max Applied Surge Pulse Joule Rating: Unlimited, due to current limiting. (8x20 us)
9. Max Applied Surge Pulse Current: 100,000 amperes (8x20 us)
10. UL 1449-2 Adjunct
11. UL 1449-2 Adjunct Classification Test Results: 1000 surges, 6000 volts, 3000 amps, C1 pulse, measured suppressed voltage 290 volts, no failures.

B. Acceptable Manufacturer

1. SurgeX SX20-NE/RT. Provide one power conditioner for each 20-amp circuit.
2. Leviton
3. Northern Technologies

2.3 DATA LINE SURGE PROTECTION

A. Specifications

1.	Primary Tech:	Bipolar Silicon Avalanche Diode
2.	Operating Frequency:	DC to 30 MHz
3.	Response Time:	<5 nanoseconds
4.	Protected Lines:	Two pairs
5.	Peak Pulse Energy Disp:	10 joules each mode
6.	Interface:	Wire clamp terminals
7.	Current Rating:	7 amps max
8.	Series Impedance:	<.01 ohms
9.	UL497B listed	

B. Acceptable Manufacturer

1. Northern Technologies PLP-S series surge protectors.
2. Edco
3. Ditek

2.4 RS-232 SURGE PROTECTION

A. Specifications

1.	Max Operating Voltage:	+/- 20 V
2.	Typ. Leakage current:	5 u amps
3.	Max Data Rate:	22 kbps
4.	Max Surge Current(10x1000usec):	43 amps
5.	Max Clamp Voltage :	35 volts
6.	Max Transient Voltage :	6 kV
7.	Clamp Response Time:	< 1 nanosecond
8.	UL 497B listed	

B. Acceptable Manufacturers:

1. Edco SRS-232 series surge protector
2. Northern Technologies
3. Ditek

2.5 TELEPHONE LINE SURGE PROTECTION

A. Specification

1.	Breakdown Voltage :	270 Volts
2.	Max Peak Pulse Current :	200 A (tip and ring to ground)
3.	Typical Capacitance :	100 pf
4.	Max Continuos Current :	145 mA
5.	UL497A Listed	

B. Acceptable Manufacture

1. Edco HCO series surge protector. Provide EDCO MGB Ground Rail. Coordinate connection to ground.
2. Northern Technologies

3. Ditek

2.6 UNINTERRUPTIBLE POWER SUPPLIES

A. Specifications:

1.	Nominal Voltage:	120 VAC
2.	Input Voltage Range:	92 – 147V
3.	Operating Frequency:	50/60 Hz, Auto-sensing +/- 3Hz
4.	Frequency Range:	46-65 Hz
5.	Voltage Wave Shape:	Sine Wave (on battery)
6.	Output Connection:	NEMA 5 - 15
7.	Battery Type:	Sealed, lead-acid; maintenance free
8.	Recharge Time:	5 hours
9.	Battery Replacement:	(1) RBC-11
10.	Audible Alarm:	On battery, low battery, overload, UPS fault
11.	Interface Port:	RS-232 single serial card
12.	Safety Certifications:	UL 1778
13.	Audible Noise:	53 dBa typical @ 1 meter
14.	Size UPS based on 150% of calculated load but not smaller than 1000VA.	

B. Acceptable Manufacturer:

1. APC
2. Liebert
3. Eaton

2.7 GROUNDING BUSS BAR

A. Specifications:

1.	Predrilled solid copper	
2.	NEMA standard bolt hole spacing	
3.	0.25” thick minimum	
4.	Minimum dimensions:	4” high x 12” wide size to accommodate required connections.
5.	Mounting:	Minimum 2” insulated standoffs.
6.	Cover:	Lettered plexiglass as detailed in drawings.

B. Acceptable Manufactures:

1. Hager Lightning Protection, Inc.
2. Square D
3. Storm Copper Components

2.8 GROUNDING CONDUCTORS

A. Specifications:

1. Gauge:

a.	>13':	6 AWG
b.	14 – 20':	4 AWG
c.	21 – 26':	3 AWG
d.	27 – 33':	2 AWG
e.	34 – 41':	1 AWG
f.	42 – 52':	1/0 AWG
g.	53 – 66':	2/0 AWG
h.	67 and greater:	3/0 AWG

2. Insulation:

   a. Green PLC 600 volt rated

B. Acceptable Manufacturers:

1. Alpha Cable
2. Belden Cable
3. General Cable

PART 3 - EXECUTION

3.1 INSTALLATION

A. The System shall be installed by qualified personnel in strict compliance with manufacturer's instructions.

B. Wiring shall be color coded, uniform and in accordance with national electric codes and manufacturer's instructions.

C. Equipment shall be firmly secured, plumb and level.

D. All cable shall be tagged and identified.

E. Coordinate all work with other trades.

F. Grounding of cables, and peripheral equipment shall be installed per manufacturer's direction to eliminate noise induction and achieve optimum system performance.

G. The Contractor shall provide power line surge and noise suppressor/filters for all equipment proposed. These devices shall buffer all access control system components.

3.2 SYSTEM INITIALIZING AND PROGRAMMING

A. The power system shall be turned on and adjustment made to meet requirements of the specification and on-site conditions prior to powering any 17900 series systems.

B. Verify the output voltage of each power source outlet is within NEC guidelines for variation in voltage.

C. All UPS units shall be fully charged prior to powering any 17900 series systems.

3.3 GROUNDING

A. All equipment shall be grounded in accordance with the NEC, these specifications, IEEE 1100 and the equipment supplier's recommendations. Discrepancies shall be brought to the attention of the Architect for resolution prior to execution of the work.

B. Power ground system and signal ground system shall remain physically separated throughout the facility and terminated at a single point on ground buss bar in the equipment room.

C. Each equipment cabinet shall be bonded and grouped cabinets shall be bonded together and connected at a single point on ground buss bar.

3.4 SYSTEM TEST PROCEDURES

A. The System shall be completely tested to assure that all components are hooked up and in working order. Inspect system for defects. Correct all causes of such defects. If the cause is outside of the scope of the Div. 26 scope of work, promptly notify the Architect in writing, indicating the cause of the defect and suggested corrective procedures.

B. Provide written documentation showing all test results.

C. The System shall be final tested in the presence of the Architect.

3.5 OWNER INSTRUCTION

A. Instruct owner on replacement of all user serviceable components including surge protectors, UPS units, and fuses.

B. Provide training in conformance to Div. 26.

END OF SECTION

02 Audio/Visual

1. All power circuits for the Audio Sound system must have isolated ground and isolated ground receptacles. All power circuits for the Audio Sound system will originate from one power panel.

26 05 33 Raceways and Boxes for Electrical Systems

01 Raceway

All raceway must be emt, imc, rigid. Liquid-tite or flex must only be used up to 6' in length. No Mc cable.

Require underground conduit elbows (sweeps) to be rigid steel, 1/2 wrapped with two layers of 10 mil. PVC tape applied for corrosion protection. Do not allow PVC or PVC coated elbows

Require underground conduit be installed with a warning tape 12" below grade. Specify the warning tape be of four mil plastic formulated for prolonged use underground, and resistant to destructive agents found in the soil. Require the

tape have a continuous message in permanent ink formulated for prolonged underground use and bear the words, "CAUTION -- ELECTRIC LINE BURIED BELOW" in black letters on red background.

Require Electrical Metallic Tubing (EMT) couplings and connectors are steel compression types. Do not allow the use of set screw type.

Require panelboards have a minimum of (1) 3/4" spare conduit for each equivalent 3-pole spare or space stubbed out to a readily accessible location. Require each panelboard 200 Amp or larger shall have at least one 1 1/4" spare conduit stubbed out to a readily accessible location.

Require the use of hubs and box connectors at conduit-to-enclosure connections.

In new construction, require sleeves in floor slabs to extend a minimum of two inches above the finished floor.

All electric meters shall be specified with pulse output for monitoring energy consumption by the facility's energy management system.

Designer shall investigate utility company rates and design electrical metering system according to a long-term least-cost approach for energy costs. Where multiple meters are being recommended, designer shall consider combined metering to minimize the cost of energy. Where outdoor lighting dominates (park, ball fields, parking lots), designer shall consider setting up a separate meter for outdoor lighting circuits to take advantage of city's available outdoor lighting rates.

Where additional facilities are needed to an existing campus/facility, designer shall consider totaling meters for minimizing energy costs.

02 Boxes

Require that multiple-gang boxes be used where more than one device is mounted in a common enclosure; do not permit the use of sectional boxes. Require barriers to separate wiring if different voltage systems are present in the same box.

Support ceiling outlet boxes from ceiling structure. Support boxes in suspended ceiling systems from main runner channels, or joists, or other structural members.

All boxes for switches must be located on the side of the doorframe opposite the hinge close to the door trim and a height suitable for the disabled.

For boxes in suspended ceilings, supplement outlet box support with separate support to the structure as required for the expected load of the device, such as a ceiling fan.

Avoid mixing feeder and branch circuit conductors in a common pull or junction box.

Use concrete or epoxy-sand composite material junction and pull boxes in exterior underground conduit systems unless otherwise directed by the City Electrical Engineer. Equip epoxy-sand composite boxes with the manufacturer's standard top in areas where vehicular traffic is not expected. Use steel plate or

cast-iron covers and rims designed for traffic loading wherever vehicular traffic will occur. Carefully consider the largest expected vehicle box loading in specifying box and top structural requirements.

Do not use single covers for junction and pull boxes having cover length or width dimension exceeding three feet unless so approved. Sectionalize covers exceeding three feet in either dimension into two or more sections.

03 Cabinets And Enclosures

Require cabinets and enclosures to have blank ends and sides, no knockouts. The contractor is to punch out openings required. Require unused openings to be plugged with manufactured plugs.

Require cabinets and enclosures have a protective pocket inside the front cover with schematic diagram, connection diagram, and/or as applicable layout drawings of wiring and components within enclosures or boxes that contain electrical equipment, terminal strips and the like.

Require hinged covers for cabinets and enclosures that contain equipment like relays, terminal boards or terminal strips.

04 Wiring Devices

Require wiring devices to be specification grade.

Require wall switches (toggle switches, light switches) to be grounding type. For single throw switches; require installation with "ON" in the "up" position.

Require wall switch and receptacle body color to be ivory.

Require wiring device cover plates to be satin finish stainless steel.

Design the installation of wall switches to the right side of double doors, as one enters a room.

26 05 53 Identification for Electrical Systems

01 Electrical Identification

All receptacle and switch covers will be labeled with panel ID and circuit number.

Required wire markers on conductors at the panelboard and at each electrical device. Identify with panelboard or other source name and branch circuit feeder number for power and lighting circuits, and with control wire number as indicted on schematic and interconnection diagrams. For receptacle and lighting circuits, require the marker at each outlet.

Require all control and alarm wiring be identified by using numbered wire markers. Each wire shall be uniquely identified within the control system of which it is a part and uniquely identified from other control or alarm systems in the facility. Markers shall be self-adhering, wrapped around the conductor twice, and sleeved with clear heat shrink sleeves installed over the marker.

Require all junction boxes containing conductors of one circuit only be clearly and neatly labeled with indelible black ink, indicating panelboard, bus way,

enclosure, switchboard, or other source terminal point, including circuit number as applicable. For junction boxes containing multiple circuits, require conductors be tagged as indicated above.

Require all motors be identified with a permanently attached durable tag with motor designation and function. As much possible, use the equipment names as described above.

Provide a logical naming system for panelboards, safety switches, disconnects, transformers, motor control centers, enclosed circuit breakers, and so on. Require nameplates for each piece of equipment. If the electrical equipment is directly associated with a piece of mechanical or other utilization equipment, use the utilization equipment name for the electrical equipment name, preceded by the building number. In all cases, the equipment name shall begin with the building/facility number.

Require two color, engraved, micarta name plates for each separate electrical equipment item (switchboards, panelboards, disconnect switches, motor starters, transformers, transfer switches, bypass switches, generators, etc.). The name plate is to have the information described below engraved through the top layer of the plate so that the lower layer that is exposed creates the letters, numbers and symbols of the information required.

As part of the Electrical Drawings, include a sheet or sheets showing each individual nameplate to be made and affixed to the equipment enclosures. Require each nameplate to be affixed by "pop" rivets. Affixing with glue or screws is not acceptable. Each nameplate is to include the following information in the format presented.

Enclosures that do not offer adequate front surface area for all information to be included in this format on one nameplate may use nameplates of a modified format or more that one, single nameplate, but each enclosure shall have nameplates affixed showing al the required information.

As a minimum, each nameplate shall include All of the following information and information titles as shown below. If information required for at title is not applicable, then use "N/A."

EQUIPMENT	NAME
FED FROM:	SOURCE EQUIPMENT NAME (a)
CIRCUIT #:	SOURCE CIRCUIT OR BUCKET DESIGNATION (b)
THROUGH:	INTERVENING EQUIPMENT NAME (c)
VOLTAGE, # OF PHASES, # OF WIRES:	(d)
FEEDS:	DESTINATION EQUIPMENT NAME (e)
VOLTAGE, # OF PHASES, # OF WIRES:	(f)
OVER-CURRENT PROTECTION:	(g)
(h)	(h)
(h)	(h)

The FD&M approved name where the circuit originates, usually at an overcurrent protective device. This usually will be a panelboard, motor control center, etc. It

is permissible to use the transformer name if a transformer is between the source overcurrent protective device and the equipment being labeled. This would be especially true if the transformer has an overcurrent protective device on the secondary side. The decision of which "source name" to use is left to the Engineer. The convention used throughout the project must be consistent, however. The convention chosen should be consistent with nearby City facilities and should be the same or similar to the convention used in an existing facility in remodel projects where the entire facility electrical system is not replaced.

The circuit number in the source enclosure that identifies the position the circuit connection occupies. This would typically be a fuse, circuit breaker or bucket location, or similar.

If the circuit passes, for instance, through a transformer between the source panelboard and the equipment being labeled, the transformer name would go here. This could also be major junction boxes, gutters, wireways, etc. that have unique names assigned.

The voltage, AC or DC, number of phases and number of wires of the feeder from the source to the equipment, at the equipment terminals ("input"). Standard accepted abbreviations, symbols and nomenclature may be used if they are easily and generally available on engraved nameplates. A 480 volt, 60 Hz, AC, three phase, four wire wye feeder could be shown as 480V AC, 3 O, 4W; or 480V AC 3Ph, Y, or 480/277V AC Y, etc. Use easily understood nomenclature and symbols.

The name of the "load" on the circuit leaving the equipment. If multi-circuit equipment, like a panelboard or motor control center use "N/A." In the spirit of (a), it is left to the Engineer to decide if a transformer is a "load" or if the utilization equipment name should go here.

The voltage, AC or DC, number of phases and number of wires of the feeder leaving the equipment being labeled, at the equipment terminals ("output"). Standard accepted abbreviations, symbols and nomenclature may be used if they are easily and generally available on engraved nameplates. See (d), above. Use easily understood nomenclature and symbols.

If there are overcurrent protective devices in the enclosure being labeled, specify the basic information regarding the overcurrent protective devices here. For circuit breakers, at a minimum show circuit breaker frame size, trip setting or rating, maximum voltage rating and maximum interrupting rating. For fuses, at a minimum show current rating, class, maximum voltage rating and maximum interrupting rating.

Reserved for possible future additional information. If not used, the rows may be eliminated from the nameplate to reduce size.

Require the nameplate be black, engraved with minimum 1/4" in height white lettering, with the equipment name being minimum 3/16" in height.

Require J-boxes for the Fire Alarm System be painted red. Require that each J-box for any other special system be marked, for example, Clock, Intercom, CATV, Security, etc.

26 08 00 Commissioning of Electrical Systems

01 Specification for Commissioning of Electrical System

COMMISSIONING OF ELECTRICAL SYSTEM

PART 1-GENERAL

1.01 GENERAL PROVISION

A. Drawings and general provision of the contract, including general conditions and division-1 and other applicable Specifications Sections, apply to Work of this section.

B. Provisions of Div. 26, Electrical General Provisions shall be made an integral part of this section.

C. Provisions of Div. 01, Contractor Quality Control, shall be made an integral part of this Section. Commissioning is a particular feature of the Contractor's Quality Control program, with all requirements, responsibilities, and recourse described in Div. 01.

1.02 WORK INCLUDES

A. Participate in the Commissioning program as specified in this section.

1.03 COMMISSIONING PROGRAM CRITERIA

A. Intent:

1. The intent of Electrical System Commissioning is to assure delivery to the Owner of Electrical systems which are fully tested and functioning in accordance with all specifications and which the Owner's personnel are fully trained and equipped to understand, operate and maintain and troubleshoot.

2. The Contractor shall execute a Commissioning Program, which delivers the intended results of an Electrical System Commissioning, using whatever personnel, time and resources are required.

3. This section provides minimum program requirements, however the contractor shall exceed those requirements whenever necessary to achieve the intent of Electrical Commissioning.

B. Commissioning Authority:

1. The Contractor shall assign a qualified individual to function as the Commissioning Authority described in Div. 01, to coordinate the Commissioning Program. The Commissioning authority reports to the System Manager of the Contractor's Quality Control Program.

C. Definitions and Abbreviations:

1. MAINTAIN ORIENTATION AND INSPECTION: At prescribed times during the Work the Contractor will walk the Owner's

Maintenance personnel through the Work, orientate them to equipment types and locations, assist access for any requested inspections, answer control. Prescribed training events and submittal of Operation and Maintenance Manuals precede the inspection.

2. EQUIPMENT PLACEMENT COMPLETION: Stage of the Work at which the major items of Division 15 and Division 16 equipment have been placed at final locations, but have not received ductwork, piping and electrical connections. Major equipment includes, but is not limited to, heating and cooling plant equipment and air-handlers.

3. DISTRIBUTION COMPLETION: Stage of the work at which distribution piping and ductwork have been installed and tested, but not insulated or concealed by further Work.

4. O&M MANUALS: Operation and Maintenance Manuals as specified in Contract documents.

5. TAB: Testing, Adjusting and balance of Division 26 equipment as specified Contract Documents.

6. Trade Representative: Person who competently represents the work force engaged by the Contractor for the 3 individual trade named. This person shall be completely familiar with the Work performed for this Contract at levels of detail of this trade and with coordination to other trades. This person shall be capable of and have authority to execute all commissioning responsibilities of the Trade as described in these Contract Documents.

7. PARTICIPATE: attend commissioning events, provide technical expertise or knowledge, equipment, measurements and observation needed or requested by the Commissioning Authority or Owner. Provide follow-up analysis, equipment data, design data, or other trade or professional service needed in response to commissioning events.

8. VERIFY: To positively determine that the measured or observed satisfies all required criteria. Simply performing the test, measurement or observation does not constitute “verification”. The test results must also be pass all Contract criteria. Tests that fail must be repeated at no additional cost to the Owner after repairs or adjustments are made, until full verification is achieved.

D. Scope: For coordination purposes, the commissioning scope includes but is not limited to the items described below. The responsibilities of Division 26 Trades with Respect to commissioning are separated out under Section 3.03 RESONSIBILITIES.

1. Document Electrical design intent.

2. Verify that equipment and systems have been properly installed in accordance with the contract documents and manufactures written installation instructions.

3. Verify that equipment has been place into operation with the manufacturer's observation and approval.

4. Assemble contract documents and record drawings.

5. Assemble operation and maintenance instructions and submittal data.

6. Verify the performance of each piece of equipment and each system.

7. Train Owner's personnel in the proper operation of each piece of equipment and each system.

8. Document warranty start and ends dates.

9. Assemble all records of codes authority inspections and approvals.

10. Monitor and enforce accessibility of all Work versus Contract documents and performance requirements of each piece of equipment.

11. Identify, document and report all deficiencies of the Work versus Contract documents and performance requirements, for tracking and correction through the Deficiency Tracking program.

D. TRADE AND SUPPLIER COMMISSIONING COST:

1. Each trade and supplier of equipment shall include in his quoted price the cost of furnishing the material requested and manpower necessary for the operation and maintenance manuals, training and system verification as specified under this Section.

PART 2-PRODUCTS

NOT APPLICATABLE TO THIS SPECIFICATION

PART 3-EXECUTION

1.01 PREPARATION OF COMMISSIONING PROGRAM

A. The Commissioning Program shall be prepared by the Contractor's Commissioning Authority. The plan shall take full cognizance of all intent and specific requirements for the Program described in Contractor Documents.

B. The Commissioning Program shall be submitted to the Owner prior to the Pre-Commissioning coordination meeting and shall be subject to approval in all aspects by the Owner. The Owner reserves the right to require changes in the Commissioning Program of personnel assigned at

any time to satisfy the Owner's quality assurance within the Commissioning Program.

1.02 COMMISSIONING TEAM

A. The Commissioning authority shall designate a commissioning team consisting of all members needed to execute the approved Commissioning Program. Minimum membership shall include:
1. Commissioning Authority
2. Mechanical Trade Representative
3. Control Trade Representative
4. Test, Adjust and Balance Trade Representative
5. Swimming Pool Trade Representative
6. Electrical Trade Representative
7. Owner's Project Engineer
8. Owner's Maintenance Engineer
9. Engineer of Record

B. The Contractor's personnel shall be made available to execute all aspects of the Commissioning Program until the Owner accepts final results. Commissioning Program tasks and meetings may be repeated until the Owner is satisfied and will not be fixed as one-time, one-chance events for the Contractor.

1.03 RESPONSIBILITY

A. CITY OF GLENDALE
1. Assign owner maintenance personnel and schedule them to participate in the various meetings, training sessions and inspections as follows:
a. Pre-commissioning coordination meeting and approval of Commissioning program.
b. Initial Owner training session at initial placement of major equipment.
c. Maintenance orientation and inspection at initial placement of major equipment.
d. Maintenance orientation and inspection at connection of distribution system.
e. Piping and ductwork test and flushing verification meetings.
f. Procedures meeting for Testing, Adjusting and Balancing.
g. Owner's training session.
h. Verification demonstration.
i. Final review and acceptance meeting.
2. Provide technicians for video taping of training session.
3. Videotape construction progress.

B. Commissioning Authority:
1. Review all Commissioning requirements and intent of the Contract Documents and all related testing, verification and quality control sessions.
2. Prepare the Commissioning Program required as part of the CQC program per Div. 01. Include list of all Trade Representative for Commissioning events by name, firm and trade specialty.

3. Execute the Commissioning program, through organization of all meetings, tests, demonstrations, training events and performance verification described in the Contract Documents and approved Commissioning Program. Organizational responsibilities include preparation of agendas, attendance lists, arrangements for faculties and timely notification to participants for each commissioning event. The Commissioning Authority shall act as chairman at all commissioning events and assure execution of all agenda items. The Commissioning Authority shall prepare minutes of every commissioning event, send copies to all attendees and the CQC system manager within 5 workdays of the event.
4. Review the plans and specifications with respect to their completeness in all areas relating to the commissioning program. This includes ensuring that the commissioning guidelines have been followed and that there are adequate items included in the design to ensure the ability to properly test, balance and adjust the system and to document the performance of each piece of equipment and each system. Any items required but not shown shall be brought to the attention of the Contractor, Owner, and architect prior to submittal of shop drawings.
5. Schedule a pre-commissioning coordination meeting within 90 days of the award of the contract, at some convenient location and at a time suitable to the Contractor and Engineer of Record. This pre-commissioning meeting will be for the purpose of reviewing the complete commissioning program and establishing tentative schedules for Maintenance orientation and inspections, O&M submittals, training sessions, job completion, system start-up and test, adjust and balance work.
6. Schedule first Owner electrical training just prior to the Maintenance orientation and inspection. This session will be attached by the Owner's Representatives, the Electrical Trade Representative, the engineer of Record and the Commissioning Authority. The Engineer of Record will conduct this session giving an overview of the system, the system design goals and the reasoning behind the selection of the equipment.
7. Schedule the first Electrical Maintenance orientation and inspection following the initial training session. The Maintenance orientation and inspection will be conducted by the Electrical Trade Representative. The emphasis in this Maintenance orientation and inspection will be an observation of the equipment location with respect to accessibility. Prepare minutes of this meeting, with separate summary deficiency by the Owner and Commissioning Authority. Distribute to attendees and CQC system manager.
8. Receive and review operation and maintenance (O&M) manuals as submitted by the Engineer of Record.
9. Schedule the second Electrical Maintenance orientation and inspection at the Distribution Completion stage. The emphasis on this Maintenance orientation and inspection will be an observation of the equipment location with respect to accessibility. The maintenance orientation and inspection will be conducted by the Electrical Trade Representative and will be attended by the Commissioning Authority, the Engineer of Record, the electrical Trade Representative and the Owner's Representative. Prepare minutes of this meeting with separate

summary of deficiency findings by the Owner and Commissioning Authority. Distribute to attendees and CQC system manager.

10. Adequate accessibility for maintenance and component replacement or repair is the Contractor's responsibility and will be checked by the Commissioning Authority at shop drawings, and during initial and final CQC phases for each item of equipment.
11. Schedule the Owner training sessions. These training sessions are to be attended by the Owner, Commissioning Authority, Engineer of Record, Contractor, Trade Representative and equipment suppliers as necessary. The format will follow the outline in the O&M Manuals. Schedule the third Maintenance orientation and inspection with hands on training as part of the training program.
12. Upon receipt of notification from the contractor the system has been started, and that the system and equipment is functioning as designed and specified, schedule the verification demonstration. These demonstrations will be conducted by the Contractor and electrical Trade Representative and witnessed by the Owner. Prepare minutes of each verification event, with separate summary of deficiency findings by the Owner and Commissioning Authority. Distribute to attendees and CQC system manager.
13. Review record drawings for accuracy against installed system. Required changes to achieve accurate drawings. Forward to engineer of Record.
14. Prepare final Commissioning report per section 3.09 and submit to Owner. Schedule final review with Owner. Present all documentation and turn over signed acceptance of the system by the Owner and Commissioning Authority to the Contractor.

C. Architect

1. Participate in the Commissioning Program by providing support to the Engineer of Record and include discussion regarding the Commissioning Program as an agenda item at all progress meetings.

D. Engineer of Record:

1. Attend initial pre-commissioning coordination meeting to be scheduled by the Commissioning Authority.
2. The Engineer of Record shall consider adequate maintenance for each piece of equipment in shop drawings and actual installation.
3. Attend the first Electrical training session on the overview of the system design, the system design goals and the reasoning behind the selection of equipment.
4. Attend the first electrical training session on the overview of the system design, the system design goals and the reasoning behind the selection of equipment.
5. Participate in first electrical Maintenance orientation and inspection following the first training session.
6. Receive and review O & M Manuals as submitted by the Contractor.

7. Participate in the second electrical Maintenance orientation and inspection at Distribution Completion stage.
8. Attend initial meeting with TAB Trade Representative as scheduled by Commissioning Authority.
9. Attend the classroom portion of the Owner training session. Attendance at the hands on demonstration is optional.
10. Review TAB report from Contractor against design requirements. Issue a report noting deficiencies requiring correction to the Commissioning Authority.
11. Attend the third Owner training session.
12. Prepare record drawings as required by contract documents and return them over to the Owner.

E. Contract
1. Include cost for commissioning requirements in the contract price. Include commissioning requirements in the electrical sub-contracts and ensure full cooperation of all parties in the commissioning program.
2. Provide an acceptable Commissioning Authority to prepare and coordinate execution of the Commissioning Program.
3. Provide the Commissioning Authority with means and authority to execute Commissioning Program.
4. Coordinate the interface of the Commissioning Program to other elements within the CQC program, including deficiency tracking.

F. Electrical Trade Representative:
1. Include cost for commissioning requirements in the contract price.
2. Include requirements for submittal data, O & M data training in each purchase order or sub-contract written.
3. Enlist the support of the Commissioning Authority to ensure cooperation of other sub-Trade Representatives as necessary.
4. Ensure cooperation and participation of specialty sub-Trade Representatives as necessary.
5. Ensure participation of major equipment manufacturers and their representatives.
6. Coordinate this commissioning program with the mechanical system specified in Division 23.
7. Attend initial pre-commissioning coordination meeting scheduled by the Commissioning authority. Prepare necessary preliminary schedule for Maintenance orientation and inspections, O & M manual submission, training sessions, equipment start-up, testing and adjusting, and for completion for use by the Commissioning authority. Update schedule as appropriate throughout the construction period.
8. Attend initial training session, conduct Maintenance orientation and inspection at the equipment placement completion stage. Update drawings to the record conditions, to date, and review with the Commissioning Authority prior to the Maintenance orientation and inspection meeting.
9. Gather O & M data in all equipment, assemble in binder as required by Div. 26 -Commissioning of Electrical system. Submit to Engineer of Record to the Distribution Completion stage.
10. Conduct the second Maintenance orientation and inspection at the Distribution Completion stage. Update drawings to the

record condition, to date, and review with the Commissioning Authority prior to the inspection.

11. Notify the Commissioning authority of the time for each required test.
12. Participate in and schedule vendors and trade Representatives to participate in the training session as set up by the commissioning Authority.
13. Conduct a Maintenance orientation and inspection with hands on training. Update drawings to the record condition to date and review with the Commissioning Authority prior to the orientation.
14. Provide written certification that the following work has been completed in accordance with the plans and specification and that they are functioning as designed. Where the Work has been sub-contracted, the sub-Trade Representative shall be responsible for the initial certification with the Electrical Trade Representative recertifying that he has inspected the Work and that it has been completed and functioning as designed. This certification must be submitted to the Commissioning Authority prior to the final verification.
    a. Correct labeling of all circuits with connected equipment.
    b. Automatic operation of emergency generator and UPS equipment.
    c. Fire alarm installation.
    d. Lighting system controls operation, including occupancy sensors, automatic timing controls or energy Management control, override timers, manual dimming controls, daylight dimming controls, exterior lighting controls, multi-level switching, as applicable to the Work.
15. Demonstrate the performance of each piece of equipment to the Commissioning Authority. Schedule sub-Trade representatives as may apply to demonstrate the performance of the equipment and systems.
16. Turn over set of record mark-ups to the Engineer of Record for his final incorporation into record documents.

G. Equipment suppliers and Miscellaneous Trade Representatives:

1. Include cost for Commissioning requirements in the contract price.
2. Attend initial pre-commissioning coordination meeting scheduled by the Commissioning Authority.
3. Participate in training sessions as set up by the Commissioning Authority.
4. Demonstrate performance of equipment s applicable.

1.04 OPERATION AND MAINENANCE MANUALS

A. Operating and Maintenance Manuals:
1. Quantity: four (4)
2. Format: 3” thick, 8 ½” x 11 loose-leaf binders. Use as many as required. Do not overload binders.
3. Content:
    a. Cover sheet
    b. Table of contents (as follows):

1. Description of systems.

The description of systems will be provided by the Commissioning Authority for insertion at the time of review and before turnover to the Commissioning Authority. This description of systems will be an update version of the narrative included in Div. 26 -Electrical General Provision and will be an overview of the entire system. Simplified professional drawn system diagrams shall be provided on 8 ½ x 11 or 11 x 17 sheets. These shall include chiller, water system, condenser water system, heating system, supply air systems and exhaust system. These shall show major pieces of equipment such as pumps, chillers, boilers, control valves, expansion tanks, coils, service valves, etc. unless they are essential to understanding system operation, equipment pass arrangements, etc. is not important. Copies of these diagrams shall be framed under Plexiglas and mounted in an appropriate place. Framing and mounting shall be the responsibility of the Electrical Trade Representative. It will be the basis for the starting of the owner's instruction program.

2. Div. 26 - Electrical General Provisions through Commissioning of Electrical Systems as amended.

3. Detailed Preparation Requirements:
   A) The cover sheet shall list: project name, location, architect, structure engineer, mechanical engineer and electrical engineering firm name and address, telephone number and project manager's name for this project.
   B) Each major heading in the table of contents shall have a large distinctive, clearly marked, non-erasable, plastic encased tab.
   C) Each section shall have the following sub-tabs shall be similar to the main tabs of a different color.

      1. Specifications: The specification shall be copied and inserted complete with all addenda.
      2. Submittal and Product Data: This section shall include all approved submittal data. If submittal was not required for approval, descriptive product data shall be included.
      3. Installation Instructions: If the product, such as pipe, etc., does not have any written installation instructions, include a statement "Manufacture's Written Installation Instructions not available – Product installed in Accordance with Specifications and Good Practice".
      4. Operation and Maintenance Instructions: These shall be the written manufacturer's data edited to omit reference to products or data not applicable to this installation.
      5. Part List: These shall be edited to omit reference to items that do not apply to this installation.
      6. Equipment Supplier: This section shall include the name, address and telephone number of the manufacturer's agent and/or service agency supplying or installing and starting up of the equipment.
      7. Commissioning Checklist: This will be filled out by the Contractor with the specified data and submitted data and inserted into the manual for submission to the engineer of Record. The form shall be forwarded with the certification of system completion and commissioning request.
      8. System Distribution: This section shall include that portion of the overall description included in the beginning of the

manual as it applies to each sub-section. Specific system description will be added by the design Engineer of Record when the manuals are submitted for review and prior to forwarding to the Commissioning Authority.

9. Controls Description: This will be included in each section covering controlled equipment. It will include the description from the approved lighting submittals including as applicable to this Work:
   A) Occupancy sensor,
   B) Automatic time controls or energy Management control,
   C) Override timers,
   D) Manual dimming controls,
   E) Automatic daylight dimming controls,
   F) Exterior lighting controls,
   G) Multi-level switching,
   H) Any other lighting control as applicable to the Work.

   A copy of these control diagrams shall be framed under Plexiglas, and mounted next to the controlled equipment or in an appropriate place by the Electrical Trade Representative.

10. Condensed Operation Instructions: This section shall include condensed instruction for start-up, shutdown, emergency operation, safety precautions, unusual features and troubleshooting suggestions. Where control is clearly covered in controls description, it is not to be duplicated here.

    A copy of these instructions shall be framed under Plexiglas, and placed adjacent to the equipment where they can be easily read by operating personnel. Framing and mounting shall be the responsibility of the Electrical Trade Representative. These instructions shall be provided for boilers, furnaces, chillers, pumps, heat rejection equipment, large air handling units, exhaust fans, heat pump system, terminals, control, air compressors and dryers.

11. Preventative Maintenance Instructions: This section shall include condensed typewritten excerpts from the manufacturer's written instructions on weekly, monthly, quarterly, annually, etc. This summary shall be prepared by the electrical Trade Representative with help from equipment suppliers. It will be reviewed by the Engineer of Record prior to turning over to the Commissioning Authority. It shall be prepared for all items listed under condenser operating instructions above plus package, window or through the wall AC units and electric unitary heating equipment.

D) This Section, Commissioning of Electrical System shall contain the following sections:
   1. Specification.
   2. Commissioning Plan for electrical systems.
   3. Final Report of the Commissioning authority on electrical systems.

B. Review and submittal Requirements:
   1. The O&M manuals shall be reviewed at the equipment placement completion stage, which shall be defined as that time in the project when the major pieces of equipment have been set in place ready for connection to piping and duct systems.
   2. In order to ensure that the O&M manuals are submitted in timely manner and to give a reasonable time for compliance, any progress payments for division 26 work beyond 75% of scheduled value shall not be approved until this submittal has been received and provisionally approved.

1.05 TRAINING OF OWNERS OPERATORS

A. The owners shall be given comprehensive training in the understanding of the systems and the operation and maintenance of each major piece of equipment.

B. The Commissioning Authority, in cooperation with the County Engineer and Contractor, will be responsible for scheduling the training which shall start with classroom sessions followed by hands on training on each piece of equipment. Hands on training shall include start-up, operation in all possible, shutdown and any emergency procedures.

C. Training shall be conducted in a minimum of three sectors. The first, or systems orientation portion, shall be scheduled prior to the equipment placement Maintenance orientation and inspection. This training session will include a review of all systems using the simplified system schematics including chilled water systems, condenser water or heat rejection systems, heating systems, fuel oil supply systems, supply air systems and exhaust system.

D. The second, or equipment portion, shall be scheduled as soon as possible after start-up of the equipment.

E. The third, or commissioning portion shall be conducted after completion of this work.

F. Classroom sessions shall include the use of overhead projections, slides, video and audio taped material as might be appropriate.

G. The training session shall follow the outline in the Table of Contents of the operation and maintenance manual.

H. The Engineer of Record will attend all training sessions.

I. The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. These sessions shall use the printed installations, operation and maintenance instruction material included in the O&M Manuals and shall include a review of the written O&M Installations emphasizing safe and proper operating requirements and preventative maintenance. Training will be included for all major pieces of equipment including pumps, boilers, furnaces, chillers, heat rejection equipment, air conditioning units, air handling units, fans, air terminals, control and water treatment systems. Equipment training shall be done by qualified service engineers employed by the manufacturers or their qualified sales representatives.

The orientation and inspection function of the equipment in the system shall be discussed.

j. Each classroom training session shall be followed by an inspection, explanation and demonstration of the equipment. The start-up and shutdown modes of operation shall be demonstrated.

K. The Contractor shall attend all sessions and shall add to each session any special information relating to the details of installation of the equipment as it might impact the operation and maintenance.

L. The Engineer of Record shall conduct a final session summarizing the commissioning program.

1.06 NOTIFICATION OF SYSTEM COMPLETION AND REQUEST FOR FINAL ELECTRICAL SYSTEM COMMISSIONING VERIFICATION

A. When systems are ready for final commissioning verification, the electrical Trade Representative shall notify the Commissioning authority in writing. Commissioning data sheets must be complete through the column labeled “Balanced” and included with the request.

B. Should the verification test reveal that the equipment is not performing as specific or control operation is not acceptable, the Contractor will be entitled to one-inspection of any failed item at no additional cost.

C. Should the verification test determine that the equipment is still not performing as specified or control operation is not acceptable on the second inspection, the time and expenses of the engineer of Record if applicable, to make further verification shall be considered as additional cost to the Owner. The total sum of such cost shall be deducted from the final payment to the Contractor.

1.07 VERIFICATION OF PERFORMANCE

A. Verification of performance will take place after certification of the completion of the construction. Performance demonstration shall be done by the Electrical trade representative and shall be witnessed by the Commissioning authority and the Owner’s representative.

B. The specified, submittal and installed data shall be entered on the Commissioning Data Sheets at the time of verification.

C. The following demonstrations will be required:

1. Correct labeling of all circuits with connected equipment. Break circuit and observe equipment or check voltage at equipment to verify.
2. Automatic operation of emergency generator and UPS equipment. Perform simulation of actual power outage.
3. Fire alarm installation and operation under actual smoke detection.
4. Lighting system controls operations, including occupancy sensors. Automatic time controls or Energy Management control, override timers, manual dimming controls, daylight dimming controls, exterior lighting controls, multi-level switching,

as applicable to the Work. Meet all demonstration requests by the Owner.

1.08 PHASING OF CONSTRUCTION AND COMMISSIONING

A. For large multi-structure projects, the commissioning plan will take into account the staged start-up of each phase completion.

1.09 COMMISSIONING DATA SHEETS

A. Electrical commissioning data sheet shall be developed by the Commissioning authority with assistance of the Electrical Trade Representative. Commissioning data sheets shall cover all testing of electrical systems described in the specification of individual in Division 16, as well as all items listed under VERIFICATION OF PERFORMANCE. Commissioning Data Sheets shall be submitted with the initial Commissioning Plan for review and approval by the Owner.

3.10 REPORT REQUIREMENTS

A. The commissioning authority shall document each commissioning event with meeting minutes or a report. The documents shall separately list deficiencies observed or discovered during the event. The document shall be distributed to Commissioning Team member and the CQC system manager.

B. The Commissioning Authority shall prepare a final formal report to the Owner which will include a narrative in the form of an Executive Summary of the results of program, impressions of the training sessions and the level of operating competence and a certification that the verification each item is complete and all systems are operating as intended.

C. Transmitted with the report shall be Edited Operation and Maintenance Manuals including:

1. Commissioning Data Sheets.
2. Warranties.
3. Permits and Inspection Report.

26 09 00 Instrumentation and Control for Electrical Systems

2610 00 Medium-Voltage Electrical Distribution

26 11 00 Substations

26 12 00 Medium-Voltage Transformers

26 13 00 Medium-Voltage Switchgear

26 18 00 Medium-Voltage Circuit Protection Devices

26 20 00 Low-Voltage Electrical Transmission

26 22 00 Low-Voltage Transformers

26 23 00 Low-Voltage Switchgear

26 24 00 Switchboards and Panelboards

25 24 13 Panelboards

All electrical equipment to be Square D with the ability for future expansion.

Provide minimum 20% spare circuit breaker or fused switch positions (i.e. spaces) that are complete in all respects, completely bussed and ready for future installation of the fused switch or breaker of maximum rating and frame size used in panelboard.

Require fully rated copper bussed panelboards. Series rated and/or aluminum bussed panelboards are not acceptable.

Require bolt-in circuit breakers. Plug-in circuit breakers are not acceptable.

Require panelboards to be "door-in-door" hinged construction.

Require all locks on panelboards on one project to be keyed alike.

Require measurement of the phase currents at each panel with the panel at expected maximum demand. Require balancing of the phase currents at each panel to within +/- 5% of the calculated average bus current, or as close as possible. Provide written record of the balanced bus current values.

Use panelboards with isolated ground buss where significant numbers of switching power supplies are used in computers or other equipment.

Where the number of computers is expected to be significant (Like an office space with "a computer on every desk"), carefully consider the use of K-Rated transformers and isolated ground panelboards and branch circuits. Consider costs when deciding to use the isolated ground system to supply only computer loads or to also supply general receptacles from this system

26 25 00 Enclosed Bus Assemblies

26 26 00 Power Distribution Units

26 27 00 Low-Voltage Distribution Equipment

26 28 00 Low-Voltage Circuit Protective Devices

01 Overcurrent Protective Devices

Require all circuit breakers in the same system to be of the same manufacturer. Require all fuses in the same system to be of the same manufacturer.

Require power fuses be equipped with a blown-fuse indicator that provides visible evidence of fuse operation while installed in the fuse mounting.

Require circuit breakers have non-welding, non-corroding contacts, automatic tripping clearly indicated by the handle position, a minimum 10,000 RMS AIC rating trip current.

26 29 00 Low-Voltage Controllers

26 30 00 Facility Electrical Power Generating and Storing Equipment

26 31 00 Photovoltaic Collectors

26 32 00 Packaged Generator Assemblies

26 33 00 Battery Equipment

26 35 00 Power Filters and Conditioners

26 36 00 Transfer Switches

26 40 00 Electrical and Cathodic Protection

26 41 00 Facility Lightning Protection

26 42 00 Cathodic Protection

26 43 00 Transient Voltage Suppression

26 50 00 Lighting

26 51 00 Interior Lighting

01 General

Daylighting shall be considered to reduce lighting load. Lighting circuits to be separated in the perimeter zones to allow for shutting off certain fixtures when they are not needed.

All stairwell lighting must be mounted in a location that not only provides ample lighting, but also easy accessibility for maintenance from stairwell landings.

Lighting timers should be Paragon EL 72.

02 Illumination Level Criteria

Illumination levels are intended to be maintained at task surface. This does not mean that the whole facility must be maintained at the same illumination levels. In offices with a workstation environment, the illumination at task shall be 50 FC but the general area can be maintained at 25-30 FC. The following maintained illumination levels shall be provided. (Note: illumination levels shall be based on group relamping at approximately 15,000 hours):

Area	Level
Service Garages	
Task surface/work bays	75 FC
General area	50 FC
Walkways/driveways	20 FC
Exits at floor	5 FC
Library reading room	
Study and notes	70 FC
Ordinary reading	30 FC
Machine shop	50 FC
Materials handling	50 FC

Offices	
Workstation/task surface	50 FC
Walkways/general	25-30 FC
Equipment rooms and washrooms	30 FC
Parking lots	0.5 FC
Parking garages (floor avg.)	5 FC
Storage room/warehouses	20 FC
Corridors	10 FC

For sports facilities lighting levels, contact the

_____

_____

Switching shall be provided for each lighting circuit or for portions of each circuit, in a single room, so that the partial lighting for custodial service, or other complementary use with natural lighting, may be selectively operated.

26 51 13 Interior Lighting Fixtures, Lamps and Ballasts

26 52 00 Emergency Lighting

26 53 00 Exit Signs

26 54 00 Classified Location Lighting

26 55 00 Special Purpose Lighting

26 55 33 Hazard Warning Lighting

26 55 36 Obstruction Lighting

26 55 53 Security Lighting

26 55 59 Display Lighting

26 55 61 Theatrical Lighting

01 Specification for Theatrical Lighting

THEATRICAL LIGHTING SYSTEM

PART1 -GENERAL

1.1 SCOPE OF WORK

A. Work includes all labor, materials, tools, transportation services, supervision, coordination, etc., necessary to complete the installation of the theatrical lighting system, as described in these specifications and illustrated on the associated drawings. The system includes the following major items:

1. Complete theatrical lighting systems including dimmer racks, dimmer modules, and theatrical lighting instruments.
2. Lighting control systems including lighting control panels, Lighting data outlet locations and associated electronics and wiring.

B. The contract also includes:

1. Verification of dimensions and conditions at the job site.
2. Preparation of submittal information.
3. Installation in accordance with the contract documents, manufacturer's recommendations, and all applicable code requirements.
4. Initial tests and adjustments, written report, and documentation.
5. Instruction of operating personnel; preparation of user manuals.
6. Maintenance services; warranty.

C. This contract will be administered by the City of Glendale or their representative.

1.2 RESPONSIBILITY AND RELATED WORK

A. Coordinate work with the City of Glendale, General Contractor, Electrical Contractor and the scheduled work of other trades.

B. The Theatrical Lighting contractor is responsible the provision and installation of all equipment and wiring listed herein. This includes, control panels, interface panels, control electronics, dimmer racks, and dimming modules in this design. The Theatrical Lighting contractor will also provide commissioning including systems testing, checkout, and programming at the completion of the project.

C. The electrical contractor is responsible for the provision and installation of all AC power to the lighting dimmer racks, installation and termination of dimmer racks and lighting distribution circuits including conduit, junction boxes, and electrical wire-ways for lighting
distribution and control lines-

D. Refer to all electrical drawings and specifications in addition to the theatrical lighting systems drawings for related conduit, cabling, power, and distribution details. Supply accessories and minor equipment items needed for a complete system, even if not specifically mentioned herein or on the drawings, without claim for additional payment.

E. Notwithstanding any detailed information in the Contract Documents, it is the responsibility of the Theatrical Lighting contractor to supply systems in full working order.
Notify the Consultant of any discrepancies in part numbers or quantities before bid. Supply items and quantities according to the Intent of the Specification and Drawings without claim for additional payment.

F. Obtain all permits necessary for the execution of any work pertaining to the installation, or any operation by the owner and contractor.

G. Execute all work in accordance with the National Electric code, the National Electrical Safety Code and all applicable local and State codes, ordinances, and regulations. If a conflict develops between the contract documents and the appropriate codes and is reported to the City of Glendale Project Manager/Representative prior to bid opening, the City of Glendale’s Project Manager/Representative will prepare the necessary clarification. Where a conflict is reported after contract award, propose a resolution of the conflict and, upon approval in writing from City of Glendale Project Manager/Representative, perform work.

1.3 REFERENCES

A. National Fire Protection Association (N.F.P.A.)

B. National Electrical Code (N.E.C.) and California Electric Code (C.E.C.)

C. American National Safety Institute (A.N-S.I.)

D. Electronics Industries Association (E.I.A)

E. Sound System Engineering (2nd Edition), Davis and Davis, Howard W. Sams. 1987

F. Audio System - Design and Installation. Giddings. Howard W, Sams, 1990

G. Cable Television Technology. Kenneth T. Deschler, New York: McGraw-Hili. Inc., 1987

1.4 SYSTEM DESCRIPTION

A. Theatrical Lighting System

1. The theatrical lighting system will provide controlled lighting for the platform area including dimming, distribution, and rigging.

B. Architectural Lighting Control System

1. The architectural lighting system will provide lighting for the general area of the auditorium/room. Control of the architectural lighting system, will be provided by wall mounted pushbutton control panels.
2. The Architectural Lighting dimming rack will be shared between the theatrical and the architectural lighting systems.
3. Architectural lighting fixtures are not included in the scope of this specification although control should be provided on the theatrical lighting control surface.

1.5 SUBMITTALS

A. Submit all shop drawings and submittals in accordance with project standards. Quantities listed herein are the minimum required of this contractor.

B. Shop drawings and submittal data shall contain sufficient information to describe the work to be performed. Drawings shall be executed at an appropriate scale, not smaller than 1/8" = 1 '-O". Submit five (5) black and white sets and 1 CD-ROM set of drawings; submit 2 copies of catalog data sheets (8-1/2" x 11") neatly bound in sets. Submit all Shop Drawing information at one time. Information shall include but not necessarily be limited to;

1. System control riser diagram.
2. System distribution riser diagram.
3. Control; wiring charts.
4. Dimmer rack and module physical and electrical details.
5. Control systems physical and electrical details.
6. Distribution raceway physical details.
7. Other details or schematics required for systems operation.

C. Contract Closeout Submittals

1. Keep a complete set of drawings on the job, note any changes made during installation, and submit 1 corrected set of reproducible mylar drawings showing Work as installed. Also include this information in one CD-ROM set submitted to the City of Glendale.

2. Submit the following data for review, prepared as Indicated, at least one week prior to acceptance testing (exceptions noted):
   a. System Reference Manual: Furnish 2 copies, in 3-ring binders, sized to hold the material plus 50 percent excess, with clear vinyl pockets on cover and spine for project title. Provide tabular dividers with permanent legends for the following sections:
      (1) System Operation and Instructions: Prepare a complete and typical procedure for the operation of the equipment as a system, organized by subsystem or activity. This procedure shall describe the operation of all system capabilities. Assume the intended reader of the manual to be technically inexperienced and unfamiliar with this facility.
      (2) A list of all equipment, indicating manufacturer, model, serial number, and equipment rack location. Update following acceptance testing, if changed.
      (3) A list of settings of all semi-fixed controls. Update following acceptance testing.
      (4) Photographically reproduced schematic wiring diagrams of each major sub-system, based on the as-built documentation, at a reduced scale easy to handle but fully legible. Blue-line (or similar diazo process) prints are not acceptable.
      (5) Maintenance Instructions, including Installer's maintenance phone number(s) and hours; maintenance schedule; description of products recommended or provided for maintenance purposes, and Instructions for the proper use of these products.
      (6) Manufacturer's Instruction Manuals for all items of equipment, incorporating or followed by manufacturer's warranty statements. For custom circuits or modifications, a description of the purpose, capabilities, and operation of each Item,
      (7) Any other pertinent data generated during the project or required for future service.
   b. Photographically reproduced as-built headend wiring diagrams and overall building wiring diagrams, at a reduced scale easy to handle but fully legible. Blue-line (or similar diazo process) prints are not acceptable. Mount wiring diagrams behind Plexiglas in the equipment racks.

1.6 SUBSTITUTIONS

A. Request for substitutions shall be submitted in writing. Requests shall be submitted to the City of Glendale’s Project Managerc/Representative no later than 1 week before the bid opening. Confirmation of the acceptance of substitutions shall be issued to all bidders of record as addenda to the Drawings and Specifications and will become part of the Contract Documents. The City of

Glendale's Project Manager/Representative will not be responsible for oral clarification.

B. Substitutions after Bid award will only be considered when a Product becomes obsolete or commercially unavailable through no fault of the Contractor.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

1.7 QUALITY ASSURANCE

A. Qualifications and Experience

B. The following criteria will be used as a standard for judging installation qualification and project experience:

1. Installing Contractor to have previously installed jobs of similar magnitude, completed within the last five years. Similar magnitude includes: equal or larger venue size, system cost and complexity. Provide evidence of at least one such completed job for inspection by the City of Glendale's Project Manager/Representative. Information to include, project scope, system description, system cost and references.
2. Installing Contractor to have at least five years experience with equipment and systems of the types specified.
3. The installing Contractor shall maintain a fully staffed and equipped service facility, and shall be a franchised dealer for the major brands specified.
4. The Installing Contractor shall be properly licensed to work in Glendale, Arizona.
5. The Installing Contractor shall have staffing and computer systems to produce acceptable quality shop drawings and project record documents. Schematic diagrams, speaker location, orientation, rigging, fabrication and layout details to be produced using AutoCAD R14 or later.

C. Contractor Qualification Submittals Submittals for qualification must include all of the following:

1. A description of the installing contractor's fulfillment of qualifications and experience in all areas listed in the section above.
2. A brief company description outlining company history including how long the company has been in business, the number of personnel employed, etc.
3. Resumes of staff that will be involved in working on the project and their roles. Include education, training, experience, professional societies, and notable contributions to the industry.
4. Representative project list. Include a project description, company personnel who worked on the project with their involvement, and a reference point of contact. Note whether the key personnel involved in these projects are still employed with the company.
5. Samples of project documentation. Include schematic diagrams, speaker orientation and rigging details, panel fabrication details, and any other applicable documentation.

1.8 PROJECT CONDITIONS

A. Verify ail conditions on the job site applicable to this work. Notify the City of Glendale's Project Manager/Representative in writing of discrepancies, conflicts, or omissions promptly upon discovery.

B. The drawings diagrammatically show cables, conduit, wiring, and arrangements of equipment fitting the space available without interference. If conditions exist at the job site which make it Impossible to install work as shown, recommend solutions and/or submit drawings to the City of Glendale's Project Manager/Representative for approval, showing how the work shall be installed.

1.9 ACCEPTANCE TESTING

A. Upon completion of installation and initial tests and adjustments specified in part 3, acceptance testing shall be performed by the City of Glendale.

B. Provide personnel familiar with all aspects of the system to assist during acceptance testing in accordance with part 3 of this specification.

C. The process of acceptance testing the system shall necessitate moving and adjusting certain component parts; perform such adjustments without claim for additional payment.

1.10 WARRANTY

A. Installer shall warrant equipment to be free of defects in materials and workmanship for not less than one year after date of Final Acceptance. Defects occurring in labor or materials within one-year warranty shall be rectified by replacement or repair. Within the warranty period, provide answer to service calls and requests for information within a 24-hour period, and repair or replace any faulty item within a 72-hour period without charge, including parts and labor.

B. This warranty shall not void specific warranties issued by manufacturers for greater periods of time. Nor shall it void any rights guarantied to the City of Glendale by law.

C. Contractor to provide the City of Glendale's Project Manager with exact beginning and ending dates of the warranty period. Include the name of the person to call for service and telephone number. This information to be part of Project Record Drawings.

PART 2- PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Model numbers and manufacturers included in this specification are listed as a standard of quality. Specific model will be dependant on the needs of the facility and approval of the City of Glendale's Building Standards Committee. Equivalent substitutions, shall be approved by the City of Glendale's Projector/Representative in writing. Any proposed substitutions shall meet all specifications of the specified equipment. Proposed equivalent substitutions approved in writing by the City of Glendale's Projector Manager/Representative will be considered acceptable substitutions.

B. Other qualified manufacturers will be considered subject to approval by City of Glendale's Building Standards Committee.

2.2 GENERAL

A. All equipment and materials shall be new, and shall conform with applicable UL. CSA, or ANSI provisions. Take care during installation to prevent scratches, dents, chips, etc. Damaged equipment shall be replaced with new equipment at no cost to the City of Glendale.

B. Regardless of the length or completeness of the descriptive paragraph herein, each device shall meet all of its published manufacturer's specifications. Verify performance as require Where two or more acceptable products are listed, the Installer shall use either at his option.

C. Install all rack mounted equipment with black 10-32 button head machine screws with Phillips drive unless otherwise specified.

D. Provide security covers on all non-user-operated equipment having front panel controls. Install covers at the conclusion of Acceptance Testing as described in Part 3.

E. Custom rack panels shall be 1/8-inch thick aluminum, standard EIA sizes, brushed black anodized finish unless otherwise noted (Brush in direction of aluminum grain only). Custom connector plates (DMX. RFU, etc.) are typically stainless steel; however, it is the Installer's responsibility to verify plate finish with the City of Glendale's Project Manager/Representative. Plastic plates will not be accepted.

F. All engraving shall be 1/8-inch block sans serif characters unless noted otherwise. On dark panels or pushbuttons, letters shall be white; on stainless steel or brushed natural aluminum plates, or light-colored pushbuttons, letters shall be black,

2.3 ARCHITECTURAL LIGHTING CONTROL SYSTEM

A. Architectural Lighting LCD Station

1. Provide portable consolette.
2. Station is to connect to LCD Station Connector Panel with 10' or longer cable.

B. Architectural Lighting LCD Station Connector Station

C. Architectural Lighting Entry Station

D. City of Glendale is to have full access to system (i.e.: Software passwords, Keys, etc.)

2.4 THEATRICAL LIGHTING DIMMING SYSTEM

A. Theatrical Lighting Control Console

1. Provide Remote Focus Unit and one 50' RFU cable.
2. Provide UPS, keyboard, mouse, and monitors as specified by console.

B. Dimmer Rack

1. Install blank modules to cover unused openings.

2. Rack shall be able to accommodate additional modules for future expansion.
   a. ETC preferred

C. Dimmer Rack Control Module

1. Include one spare module (total) for the project.
   a. ETC Preferred

D. Dimmer Modules

1. Include one spare module (total) for the project.
   a. ETC Preferred
3. Dimmer modules shall be rated for two 20A circuits, 800[AS rise time.

   a. ETC Sensor dimmer modules

E. Architectural Lighting Processor

1. Mount in rack next to dimmer racks.
2. Install blank panels to cover unused openings.
4. Connect to dimming system and test for correct operation.

F. Pipe-Mounted Outlet Box

1. Mount box at locations shown on drawings.
2. 18" Pigtails with 3 pin 20 Amp grounded stage pin type connectors to be used for conventional lighting circuits.
3. Circuits to be located as shown on drawing set.
4. Layout panel as shown on drawings.
5. Box shall be UL listed,
   a. ETC or SSRC Pipe-Mounted Outlet Box

G. Floor Outlet Box

1. Mount box flush in floor at locations shown on drawings.
2. Flush mounted 3 pin 20 Amp grounded stage pin type connectors to be used for conventional lighting circuits.
3. Circuits to be located as shown on drawing set.
4. Layout panel as shown on drawings.
5. Box shall be UL listed.
   a. ETC or SSRC Floor Outlet Box

H. Wall Mounted Outlet Box

1. Mount box flush with wall at locations shown on drawings.
2. Flush mounted 3 pin 20 Amp grounded stage pin type connectors to be used for conventional lighting circuits.
3. Circuits to be located as shown on drawing set.
4. Layout panel as shown on drawings.
5. Box shall be UL listed.
   a. ETC or SSRC Wall Outlet Box

I. Retractable Lighting Position

1. General

a. The Retractable Lighting Position (RLP) shall be designed to hang and power standard theatrical lighting fixtures. The unit shall be a non-obtrusive retractable hanging and plugging device for architectural surroundings.

b. The unit shall be UL and CUL LISTED

2. Electrical

a. There shall be four panel mount outlets on the sliding section of the unit. Connector options shall include:
   (1). Parallel Blade (Edison NEMA 5-20R)
   (2). 20A Stage Pin
   (3). 20A Twist-Lock (NEMA L5-20R)
   (4). Low voltage option - one or more DMX receptacles in place of one or more power connectors

c. The outlets shall be wired through a flexible conduit to a terminal box on the permanent upper section of the unit.

3. Mechanical

a. The unit shall be fabricated from 11-gauge steel with mounting hardware for permanent support included. It shall be finished with fine-textured, scratch-resistant, black powder coat.

b. The unit shall support up to 1000 pounds direct pull from center and up to 300 pounds from any point on the pipe.

c. A finger-operated latching mechanism shall hold the sliding device in place above ceiling. Rapid descent shall be prevented by a counter-balance system.

d. The unit shall require a 26” clearance above the ceiling in a stored position (ceiling to top of unit) and a 16” drop from ceiling to ceiling plate in working position (ceiling to bottom of unit).

e. A standard white ceiling plate and a 42” Schedule 40 1-1/2” black pipe shall be included.

J Automated Lighting Power Distro Panel

1. Furnished and installed by Electrical Contractor.
   a. Square D QO Series Load Center or PanelBoard with SquareD QO
   series 2-pole circuit breakers.

K. City of Glendale is to have full access to system (i.e.: Software passwords, Keys, etc.)

2.5 THEATRICAL LIGHTING DMX DISTRIBUTION SYSTEM

A. DMX Nodes

1. Provide input and output versions as shown on drawings.
2. Provide node power supply as specified by node manufacture.
3. Provide Fast Ethernet Switch as specified by node manufacturer.

4. City of Glendale is to have full access to system (i.e.: Software passwords, Keys, etc.)

2.6 THEATRICAL LIGHTING INSTRUMENTS

A. Wash Fixtures
   1. Provide 1 Lamp.
   2. Provide color frame, connector, and C-clamp.
   3. Provide 1 spare lamp for every four instruments.
      a. ETC Source4ParMCM with tens kit (4 lenses)

B. Profile Fixtures
   a. Provide 1 Lamp.
   b. Provide color frame, connector, and C-clamp.
   c. Provide 1 spare lamp for every four instruments.

C. Cables
   a. 5' SPG to SPG Cable
   b. 10'SPG to SPG Cable
   c. 25' SPG to SPG Cable

2.7 CABLE

A. DMX and Ethernet cables must be in conduit unless otherwise noted.

B. Use architectural lighting system manufacturer's recommended cable for architectural lighting control system.

C. Electrical conductors installed under this contract, except where otherwise specified, shall be soft drawn annealed stranded copper having a conductivity of not less than 98% of pure copper. Acceptable Cables:
   1. DMX cable: Belden 9729
   2. RFU cable: Use manufacturer's recommended cable type.
   3. Architectural Lighting Control cable: Belden 8471
   4. Architectural Lighting LCD Control cable: Belden 8471 + 1 pair Jacketed shielded #16
   5. Cat5E Ethernet Cable: Belden MediaTwist

2.8 CONNECTORS

A Acceptable Cable-End connectors:
   1. Stage Pin: Rosco 2210 and 2410 20A connector with cover
   2. Twist-Lock: NEMA L5-20R (Hubbell or equivalent)
   3. DMX: Neutrik NC-5MX-B and NC-5FX-B
   4. Ethernet: Neutrik EtherCon

PART 3 – EXECUTION

3.1 GENERAL

A. Coordinate work with other trades to avoid causing delays in construction schedule.

B. Mount equipment and enclosures plumb and square. Permanently installed equipment to be firmly and safely held in place. Design equipment supports to support loads imposed with a safety factor of at least three. Seismic bracing shall be installed on appropriate equipment to comply with seismic requirements.

C. The process of acceptance testing the System shall necessitate moving and adjusting certain component parts including loudspeakers. Provide for adjustability from initial aiming angle and perform such adjustments without claim for additional payment.

D. Cover edges of cable pass-through holes in chassis, racks, boxes, etc., with rubber or nylon grommets.

3.2 INSTALLATION

A. Confirm by site visit and by report from electrical contractor, all field conditions, which may affect manufacture and installation of theatrical lighting system equipment prior to fabrication. Provide any additional hardware, panels and back boxes necessary to accommodate field conditions. Submit all changes of equipment and mounting details to City of Glendale Project Manager/Representative for review prior to fabrication.

B. Supply specific, detailed direction to electrical contractor as required for proper installation of all Theatrical Lighting System equipment, coordinated with actual site conditions.

C. The theatrical lighting contractor shall furnish ail items required to properly install and secure Theatrical Lighting System equipment in place. The electrical contractor shall place, install, and connect all Theatrical Lighting System equipment.

D. If any panel, distribution box, or other device requires relocation or change of mounting detail and this fact is not known until after shipment due to sequence of work, modify equipment or provide new equipment to fit revised location or mounting detail- Notify the City of Glendale Project Manager/Representative of any such changes, and submit all changes to City of Glendale Project Manager/Representative for review prior to fabrication.

E. Terminate all control wiring in dimmer banks and all control panels.

F. Supply General Contractor with all paint and supplies to correct minor cosmetic damage to equipment. Ensure that all equipment is clean and in perfect condition at time of Completion Checkout.

G. Repair or replace any equipment, which has suffered non-cosmetic damage prior to time of Completion Checkout. Claims arising from repair or replacement of such damage shall be considered only after final acceptance of system by the City of Glendale.

H. The electrical contractor shall clean all racks, panels, and boxes of dirt, dust and debris, reassemble all equipment, and replace all panels, covers and screws prior to time of Completion Checkout.

I. Do not use any control equipment intended for installation for purpose of checking out wiring or circuitry prior to proper conditions existing on site (as specified above). Equipment may be used for such testing only in specific areas where proper conditions exist.

3.3 CONTRACTOR TESTS AND ADJUSTMENTS

A. Prior to energizing Theatrical Lighting control systems perform complete system checkout to verify that all items are correctly installed and shall safely operate as specified herein.

B. Perform all tests and adjustments specified below upon Completion of installation of Theatrical Lighting System.

C. Testing Equipment. Provide following equipment for field testing. Submit for approval a list of test equipment prior to system commissioning.

1. True RMS Multimeter (Tektronix DMM 249, or as approved), and clamp on ammeter (Tektronix DCM 320 or as approved).

2. Circuit tester/identifier (Ideal 61 -052, or as approved) and all adapters for all power receptacles provided in this section.

3. Incandescent loads to test 10% of Theatre Lighting Circuits.

D. Electrical contractor shall provide all appropriate adapters, extension cables and connectors necessary to connect test equipment to Theatrical Lighting system, and to perform all tests described below.

E. Electrical Contractor shall provide sufficient field service personnel (minimum of 1) to perform all tests specified below. The electrical contractor shall furnish sufficient workmen to operate all equipment and to assist in all tests specified below. Electrical contractor shall provide ladders and other devices, including 2 walkie-talkies, to allow access to all devices to be tested and communication between parties.

F. Test Procedures

1. Perform the following tests:
   a. Inspect all device labels to ensure that devices are correctly and clearly labeled as specified and shown in drawings.
   b. Test all circuits for proper wiring, polarity, voltage, connection to proper dimmer, and inspect for correct labeling.
   c. Test at random at least 10% of dimmers and non-dims for full load capacity for 1 hour with 1200 watt and 2400 watt resistive loads. If any devices fail, test 100% of dimmers and non-dims.
   d. Test at random at least 10% of dimmers and non-dims for overload and short circuit protection. If any devices fail, test 100% of dimmers and non-dims.
   e. Test all power receptacles provided in this section.
   f. Test console DMX connection to dimmers.
   g. Test for proper communication between dimmer control module and lighting control console.
   h. Test all entry panels for all functions. Test other panel functions a minimum of 2 times consecutively from each panel.
   i. Test all control plug-in points at least 2 times.
   j. Test all extension cables, adapters, etc. Test and adjust all spare parts.

G. Repair or replace any equipment, which fails to conform to specification, and schedule second set of tests and adjustments. Provide test equipment and personnel specified above.

H. Repeat testing and repair or replacement as necessary to make entire Theatrical Lighting System conform with specification.

1. Upon completion of testing, furnish City of Glendale Project Manager/Representative and Architect a complete report on all field testing and adjustment, certifying that system conforms to specification and that installation is complete and ready for inspection.

3.4 ACCEPTANCE

A. Acceptance testing will include operation of each major system and any other components deemed necessary. Contractor will assist in this testing. Contractor shall provide at least two technicians familiar with the installation, available for the entire testing period to assist in tests, adjustments, and final modifications. Tools and materials required to make any necessary repairs, corrections, or adjustments shall be furnished by the Contractor. Testing process is estimated to take a minimum of 1 day.

B. Provide two portable UHF business band radios for use during acceptance testing. Radios should have a transmission range sufficient to cover entire project. Radios to include rechargeable batteries and charger along with "holster" for wearing on belt. Radios to be available for duration of testing process, including any follow-up visits required prior to final acceptance. Confirm that radio frequencies used are not in use elsewhere on project site.

C. In the event the need for further adjustment or work becomes evident during equalization or acceptance testing, the Contractor will continue his work until the system is acceptable at no addition to the contract price. If final acceptance is delayed because of defective equipment, or failure of equipment, or If installation fails to meet the requirements of these specifications, the Contractor will pay for all additional cost that the City of Glendale may incur to correct the problem.

3.5 INSTRUCTION OF CITY PERSONNEL

A. Provide one technician on site for 1 day (eight hours) for instruction to City of Glendale’s designated personnel on the use and operation of the System, scheduled by an instructor fully knowledgeable and qualified in system operation. Allow City of Glendale to videotape all training sessions. The System Reference Manuals should be complete and on site at the time of this instruction.

B. The lead technician for the project Installation should be present at the first formal use of the system.

END OF SECTION

26 56 00 Exterior Lighting

26 56 01 Outdoor Lighting Ordinance

ARTICLE VIII. OUTDOOR LIGHT CONTROL

Sec. 25-131. Purpose and intent.

This article is intended to restrict the permitted use of outdoor artificial illuminating devices emitting undesirable rays into the night sky, which have a detrimental effect on astronomical observations.

Sec. 25-132. Conformance with applicable codes and ordinances.

All outdoor artificial illuminating devices shall be installed in conformance with the provisions of this article, Article II of Chapter 11, applicable provisions of the zoning ordinance and other provisions of this code. Where there is conflict between the provisions of this article and applicable provisions of the zoning ordinance or this code, the most restrictive shall govern.

Sec. 25-133. Approved materials and methods of installation.

The provisions of this article are not intended to prevent the use of any material or method of installation not specifically prescribed by this article, provided any such alternate has been approved. The development services director or, for street lighting within the right-of-way, the public works director may approve any such alternate; provided, that the proposed design, material or method:

Provides approximate equivalence to the specific requirements of this article; or,

Is otherwise satisfactory and complies with the intent of this article.

Sec. 25-134. Definitions.

Outdoor light fixtures shall mean outdoor artificial illuminating devices, outdoor fixtures, lamps and other devices, permanent or portable, used for illumination or advertisement. Such devices shall include, but are not limited to, search, spot or flood lights for:

(1) Buildings and structures, including canopies and overhangs;
(2) Recreational areas;
(3) Parking lot lighting;
(4) Landscape lighting;
(5) Billboards and signs;
(6) Street lighting;
(7) Display and service areas.

Installed shall mean the initial installation of outdoor light fixtures, defined herein, following the effective date of this article but shall not apply to those outdoor light fixtures installed prior to such date.

Fully shielded shall mean fixtures that are shielded in such a manner that light rays emitted by the fixture, either directly from the lamp or indirectly from the fixture, are projected below a horizontal plane running through the lowest point on the fixture where light is emitted.

Sec. 25-135. Shielding.

All outdoor light fixtures except those exempted by Â§ 25-139 and those regulated by Â§ 25-138(b) shall be fully shielded as required in Â§ 25-137.

Sec. 25-136. Filtering.

Those outdoor light fixtures required to be filtered by Â§ 25-137 shall have glass acrylic or translucent enclosures. (Quartz glass does not meet this requirement.)

Sec. 25-137. Requirements for shielding and filtering.

The requirements for shielding and filtering light emissions from outdoor light fixtures shall be as set forth in the following table:
REQUIREMENTS FOR SHIELDING AND FILTERING

Fixture Lamp Type Shielded Filtered

Low Pressure Sodium[6] Fully None

High Pressure Sodium Fully None

Metal Halide Fully[7] Yes

Fluorescent Fully[8] Yes[9]

Quartz[10] Fully None

Incandescent Fully None

Greater than 160W

Incandescent None

100W or Less

Mercury Vapor Not permitted (Â§ 25-138(d)

Fossil Fuel None

Glass Tubes None

filled with Neon, Argon, Krypton

Other Sources As approved by Â§ 25-133

Sec. 25-138. Prohibitions.

(a) Mercury vapor. The installation of mercury vapor fixtures is prohibited.

Sec. 25-139. Exemptions.

Sec. 25-140. Applications.

Sec. 25-141. Issuance of permit for lighting on private property.

Sec. 25-142. Amendment to permit for lighting on private property.

Sec. 25-143. Appeals.

Sec. 25-144. Request for temporary exemptions.

Sec. 25-145. Penalties.

	26 56 13	Lighting Poles and Standards
	26 56 16	Parking Lighting
	26 56 19	Roadway Lighting
‘	26 56 23	Area Lighting
	26 56 26	Landscape Lighting
	26 56 29	Site Lighting
	26 56 33	Walkway Lighting
	26 56 36	Flood Lighting
	26 56 68	Exterior Athletic Lighting

26 60 00 Reserved - Not used

26 70 00 Reserved - Not used

26 80 00 Reserved - Not used

26 90 00 Reserved - Not used

DIVISION 27 - COMMUNICATIONS

27 00 01 General Requirements

01 General

The following requirements are very general and will vary greatly depending on the size, occupancy, and purpose of the facility. The City's Information Technology Department (IT) should be included during the planning and architectural design phase of any facility construction or renovations to ensure that communications needs are adequately assessed.

Communications station wiring will be handled by the IT department, Telecommunications staff. Wiring may be performed by the staff or by an outside contractor under the supervision of IT, as determined by IT.

02 Telecommunications

a. Underground Entrance Conduits

1. The service entrance facility shall be provided and installed according to the attached site plan and information herein, using the details shown in sketches. The main telecommunications room in each facility should normally have four 4" conduits run from outside the building into the room for telecommunications purposes. One for City wiring, one for the telephone service provider, one for the cable TV service provider, and one spare.

2. Install [quantity], [size] inside diameter (PVC) Schedule 40 conduits extending from the public right-of-way to the public right-of-way. Subsequent installation of innerduct within conduits is optional.

3. The total number of bends in a conduit section run shall not exceed two 90º bends or equivalent of sweeps and radius bends. Each bend shall have a minimum radius in accordance with existing standards. All sweeps in the conduit will be rigid metal and the radius of the sweep at least 10 times the diameter of the conduit (i.e. 4" conduit, 40" rigid metal radius on the sweep).

4. Encase conduit(s) in concrete (2,500 PSI) where:
Minimum depth cannot be attained
Conduits pass under roads, driveways, or railways
Bend points are subject to movement except when terminating at a pole. When terminating at a pole, clamp the conduit(s) rigidly to the field side of the pole at a 90-degree separation from power.

5. Conduits terminating inside of a building shall be installed so that the conduit extends 10 cm (4 in., i.e., 4" After Finished Floor [AFF]) beyond the surface from which it emanates. Conduits shall be plugged with mechanical-type seals to ensure that foreign matter does not enter the building.

6. Support underground conduit runs or banks on preformed, nonmetallic siaratorsk spacing between exterior surfaces of conduits generally shall be not less than the following:
   Between telephone conduits: 2”
   Between conduits containing conductors at not over 600 volts: 2”
   Between telephone conduit and power conduit in same envelope: 12”

7. Spacing between separators shall not exceed 5 feet and be close enough to prevent sagging of conduits and breaking of couplings and watertight seals.

8. Raceways shall not be covered until approved by the architect or owner representative.

9. The ends of metallic conduit shall be reamed, bushed, and grounded according to the
   National Electrical Code.
   National electrical Safety Code (NESC).

10. All conduits shall have a noncorrosive pull-tape with a minimum of 2000-lb pulling tension installed.

c. Underground Entrance Manholes: Mark manhole location and size on the blueprints.
   1. Manhole(s) with a minimum concrete strength of 3,500 psi shall be placed where specified.
   2. The interior of each manhole shall have galvanized steel hardware that includes pulling eyes and struts for wall racks. Each manhole shall have a sump hole of at least 2-cm (8 in.) in diameter and bonding inserts.
   3. Each manhole shall have cover(s) (number depends on manhole size) that are permanently identified as required (e.g., “T” for telecommunications).
   4. Every cable in the manhole(s) and entering the building(s) shall have a permanent identification tag with cable number and identified cable count.

d. Buried Entrances
   1. The service entrance facility shall be provided and installed according to the attached site plan and information herein, using he details shown in sketches.
   2. Shoring must be placed in any trenches 1.5-m (5-ft.) deep or deeper while work is being performed.
   3. Dirt removed from the trenches that are 1.5 m (5 ft.) or more in depth must be 60 cm (2 ft) away from the trench.
   4. Encase conduits in concrete (2,500 PSI) where:
      Minimum depth cannot be attained.
      Conduits pass under roads, driveways, or railway.
      Bend points are subject to movement.
   5. In joint trenching, the minimum space requirements between telecommunications cabling and other facilities are: from power, 30 cm (12 in.); from pipes (gas, oil, water, etc.), 2.2 m (7 ft.) from nearest well-tamped earth; from railroad crossings, 1.5 m (5 ft.) below top rail when buried in concrete.

6. Place detectable orange warning tape 45 cm (18 in.) above the cable.

e. Terminating Space
   1. The terminating space for the service entrance shall have a ¾-inch trade size (20 mm) A-C plywood backboard, 8-ft. (2.4-m) high.
   2. The terminating space shall include a 120V, 20-amp AC power outlet and lighting equivalent to 540 lux (50 foot-candles) 1 m (3 ft.) above the floor.

03 Equipment Rooms
a. Specifications
   1. Backboards shall be rigidly installed and painted with a nonconductive fire-retardant overcoat (light in color).
   2. Equipment racks shall be secured and grounded.
   3. The temperature of the equipment room shall be kept between 180ºC (64ºF) and 24ºC (75ºF).
   4. Humidity in the equipment room shall be kept between of relative humidity 30 percent and 55 percent.
   5. Floors shall be static free (using asphalt/linoleum tile).
   6. Lighting intensity shall be at least 540 lux (50 footcandles), 1 m (3 st.) above the floor.
   7. Emergency lighting shall be provided.
   8. The rated distributed floor loading shall be greater than 12 kPa (250 lbf/ft²).
   10. The rated concentrated floor loading shall be greater than 4.4 kN (1000 lbf).
   11. The room shall include a minimum of two dedicated 120V AC, 20-ampere duplex outlets on separate branch circuits.
   12. To the extent possible, telecommunications rooms should be located near the middle of the floor.
   13. If structure includes more than one floor, the telecommunications rooms must be vertically stacked so that conduit sleeves are in line with each other between floors.

04 Telecommunications Rooms
a. Requirements
   1. Telecommunications rooms shall not have door sills or center posts. The door shall be _____ and installed with a lock. Size 91-cm (36-in.) W x 2.0-m (80-in.) H
   2. Three (3) walls of the room shall be lined with rigidly installed, wall-to-wall framing of Trade Size ¾-inch A-C plywood, 8-ft. (2.4-m) high.
   3. Sleeves or dam walls around floor slots shall extend 3” AFF.
   4. All sleeves shall be firestopped.
   5. Conduit(s) and cable tray(s) located in the ceiling shall protrude into the room 6 in.
   6. The room’s temperature shall be maintained at 72ºF.
   7. Ventilation shall accomplish one air change per hour.
   8. The closet shall have a rated minimum floor loading of 2.4 kPa (50 lbf/ft²).
   9. Lighting in the closet shall be at least 540 lux (50 footcandles), 1 m (3 ft.) above the floor.

10. To the extent possible, telecommunications rooms should be located near the middle of the floor.
11. Each telecommunications room shall include one #6 ground buss, located a height of 7 feet, and a minimum of two double-duplex, 120-volt, 20 amp electrical outlets (clean power). If emergency generator supplied power is available, these outlets shall be included in the load from that power source.
12. Each telecommunications room shall have a separate air-conditioning system.
13. Telecommunications room size varies depending on intended facility use, number of occupants, and service requirements of occupants.
14. Telecommunications equipment should not be housed in the same room as high voltage electric equipment.
15. Not all facilities shall have need of a telecommunications room. This requirement shall be assessed on a case-by-case basis by City of Glendale Information Technology staff.
16. Telecommunications room shall be located in the center, vertically as well as horizontally, of the facility, and included in the vertical alignment of the telecommunications rooms above and below it.
17. The main telecommunications room in each facility should have four 4" conduits run from outside the building into the room. One for City wiring, one for the telephone service provider, one for the cable TV service provider, and one spare.
18. A 5-ohm (max) ground buss shall be provided.
19. A minimum of four 120-volt AC, 20 amp double-duplex electrical outlets shall be provided (one on each wall). The actual number and location of the electrical outlets shall be assessed on a case-by-case basis.
20. All electrical outlets shall appear in a separate isolation breaker box.
21. If emergency generator supplied power is available, all outlets shall be included in the load from that power source.
22. Normally no non-telecommunications equipment (e.g. alarms, environment, electrical) should be housed in the telecommunications room. An exception is that alarm, video surveillance, and radio systems may be permitted in the same room if adequate space is provided and their presence and operation will not interfere with the telecommunications functions.
23. If structure includes more than one floor, the telephone rooms must be vertically stacked so that conduit sleeves are in line with each other between floors.
24. Patch panels, hubs, routers, fiber multiplexers, etc. will be mounted in standard 19" open ladder racks in the telecommunications rooms. The exact configuration of these racks will be set by the Information Technology department upon evaluation of the facility's needs.

05 Backbone Cable

a. Requirements

1. Each backbone cable shall be no longer than
   - multi-mode fiber, 220 m. (722 ft.) (SX GBIC specification)
   - single-mode fiber, 10 km. (32,810 ft.) (LX/LH GBIC specification)
   - 100-ohm unshielded twisted pair, 800 m (2,630 ft.) (voice circuits)

- Category 5 or better unshielded twisted pair cable used for ethernet links, 100 m. (328 ft.)

2. Cable support shall be provided by:
   - Conduits
   - Cable trays
   - Clamping cables to the plywood backboard in each room

06 Grounding, Bonding, And Electrical Protection For Telecommunications

a. Requirements

1. The grounding system shall not rely on plumbing systems.
2. Bonding conductors shall be routed with a minimum number of bends. The bends placed in the conductor should be sweeping.
3. Make all bonding connections with listed bolts, crimp pressure connectors, clamps, or lugs. Exothermic welding may be used.
4. Multiple busbars placed in a building shall be directly bonded with, minimally, a 6-AWG copper conductor.
5. Backbone cabling shall be bonded at each sheath opening.
6. Electrical Contractor will provide a #2 gauge copper wire from the main SES to the Equipment or Telecommunications room.

07 Horizontal Distribution Wiring

a. All guidelines of the American Disabilities Act (ADA) shall be incorporated into the construction specifications for the horizontal wiring systems.

b. Pathways (Conduit, Cable Tray)
To avoid electromagnetic interference (EMI), all pathways shall provide clearances of at least.
1.2 m(4 ft.) from large motors or transformers.
0.3 m (1 ft.) from conduit and cables used for electrical power distribution.
12 cm (5 in.) from fluorescent lighting.

08 Cabling

a. Station Wiring

1. The distance from the termination in the telecommunications closet to the outlet shall be 90 m (295 ft.) or less.
2. The length of patch cords and cross-connect jumpers in the telecommunications room shall be 6 m (20 ft.) or less.
3. Install a minimum of two horizontal cables from a patch panel in the telecommunications room to each outlet in a star topology. Horizontal cables to outlets shall be Category 5e or better.
4. Horizontal cabling shall be grounded in compliance with ANSI/NFPA 70 requirements and practices, except where superseded by other authorities or codes. In addition to horizontal cables, these grounding requirements apply to all involved in the horizontal distribution wiring.
   Cross-connect frames.
   Patch panel racks.
   Active telecommunications equipment
   Test apparatus used for maintenance and testing.
5. Mount outlets securely at work area locations.
6. Locate work area outlets so that the cable required to reach work area equipment will be no more than 3 m (10 ft.) long.

7. Electrical components (e.g., impedance-matching devices) at outlets shall be located outside the faceplate via a standard plug connection.
8. All connectors that provide electrical connections between 100-ohm UTP cables shall meet the requirements of ANSI/TIA/EIA-558-A. Termination connections shall be wired to the T568B standard.
9. Installation and connection of horizontal optical fiber cabling runs shall conform to ANSI/TIA/EIA-568-A. Termination connectors shall be SC type.
10. 100-ohm horizontal cable shall conform to ANSI/TIA/EIA-568-A. These specifications categorize the wiring as Category 3, 4, or 5. Termination connections shall be wired to the T568B standard.

b. Service Outlet(s)
1. Minimum 12-inch ladder rack shall be provided along hallways, and as needed in large open areas.
2. In-wall conduit shall be no less than 3/4-inch in diameter and stubbed 2-4 inches above the ceiling.
3. Outlet boxes shall be standard 4 square J-boxes equipped with a single gang mud ring and cover plate.

09 Data

Data requirements vary greatly from facility to facility depending upon the business information needs of the building occupants. Data wiring and equipment will be located with the equipment in the telecommunications room and will increase the size, power and air conditioning requirements for these spaces. Data patch panels, hubs, routers, fiber multiplexers, etc. will be mounted in standard 19" open ladder racks. The exact configuration of these racks will be set by IT (Information Technology department) upon evaluation of the user's needs. To ensure that these spaces are properly designed, it is imperative that IT staff be included during the planning and design stages of design.

10 Radio

Radio equipment installation requirements depend on the type of equipment required. These requirements require that Information Technology staff be included in the facility design and planning stages. In general, the following guidelines should be used for planning purposes.

a. Antenna Structure
1. Radio antenna requirements will dictate the size and placement of any required tower or antenna structure.
2. If the plan calls for a microwave link, antenna size (dish diameter) and loading (weight and wind loading) must first be determined. Antenna placement must be carefully planned to ensure that a proper line of sight path is maintained to the distant site and is free of obstruction from vegetation and structures.
3. It must be determined whether zoning requires special use permits for radio tower installation. FAA approval may also be required for certain tower designs.
4. All antenna structures shall be properly bonded to the facility ground system by means of exothermic connections.

b. Weatherproof Antenna Ports
1. The penetration of antenna transmission line (coaxial cable and waveguide) into the building requires the installation of a commercially made port assembly. The port assembly should be

sized to accommodate the required number of antenna transmission lines with some capacity for future expansion.

c. Radio Equipment Room

1. The radio equipment should be located in a properly sized and environmentally controlled Space, which is located as close as possible to the antenna structure.
2. If possible, the building should be planned to locate the radio equipment near or co-located with the telephone and data equipment. However, if it is not possible to locate the radio equipment near the telecommunications equipment, adequate cabling must be planned to link the radio equipment to the telecommunications equipment.
3. Proper cable management must be included in the planning. Overhead and/or under floor (computer flooring) cable trays must be provided to allow antenna, telephone, and data cabling to the radio equipment.
4. A properly sized electrical sub-panel must be installed in the radio equipment room to allow for individual electrical circuits to the radio equipment. The radio equipment sub- panel should be fed from the facility emergency power if available.
5. Service/utility electrical outlets must be provided in the walls of the radio equipment room to allow for equipment and facility servicing.
6. Adequate room lighting must be provided to allow for equipment servicing without the need for portable lighting.
7. A suitably sized single point ground window (copper bar) shall be installed in the radio room and properly bonded to the facility ground system.

11 HVAC Considerations

A thermal loading study must be performed to provide adequate cooling of the telecommunications equipment and the radio equipment planned for the facility with some margin for expansion.

27 10 00 Structured Cabling

27 20 00 Data Communications

27 21 00 Data Communications Network Equipment

27 22 00 Data Communications Hardware

27 24 00 Data Communications Peripheral Data Equipment

27 25 00 Data Communications Software

27 26 00 Data Communicati0ns Programming and Integration Services

27 30 00 Voice Communications

27 31 00 Voice Communications Switching and Routing Equipment

27 31 13 PBX/Key Systems

27 32 00 Voice Communications Telephone Sets, Facsimiles and Modems

27 32 13 Telephone Sets

27 32 23 Elevator Telephones

27 33 00 Voice Communications Messaging

27 34 00 Call Accounting

27 35 00 Call Management

27 40 00 Audio-Video Communications

27 41 00 Audio-Video Systems

27 41 13 Architecturally Integrated Audio-Video Equipment

27 41 16 Integrated Audio-Video Systems and Equipment

01 Specification for Sound Reinforcement System

SOUND REINFORCEMENT SYSTEM

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Work includes all design, documents, drawings, labor, materials, tools, transportation services, supervision. coordination, etc., necessary to complete the design and installation of the sound system, as described in these specifications. The system includes the following major items;

1. Complete sound reinforcement systems including speakers, amplifiers, processors, mixers, outboard processing equipment, and other related equipment.
2. Cables and control wiring.
3. Speaker rigging hardware.
4. Equipment Racks and Cabinet Design.
5. Control Equipment.

B. The contract also includes:

1. Verification of dimensions and conditions at the job site.
2. Preparation of submittal information.
3. Installation in accordance with the contract documents, manufacturer's recommendations, and all applicable code requirements.
4. Initial tests and adjustments, written report, and documentation.
5. Instruction of operating personnel; preparation of user manuals.
6. Maintenance services; warranty.

C. This contract will be administered by the City of Glendale or their representative.

1.2 RESPONSIBILITY AND RELATED WORK

A. Coordinate work with the City of Glendale Projector Manager, General Contractor, Electrical Contractor, and the scheduled work of other trades.

B. The Audio/Visual System Contractor shall supply any custom floor boxes and ceiling speaker back-boxes for installation by the electrical contractor.

C. Conduit, wall boxes, pull boxes, and junction boxes are provided and installed by the electrical contractor. AC Power circuits and ground wiring are provided and installed by the electrical contractor- This does not, however, relieve the Audio/Visual System Contractor from responsibility for a complete working system. Coordination with the Electrical Contractor is required to achieve a proper conduit system.

D. AC Power circuits, shall be distributed within the sound system racks by the Audio/Visual System Contractor.

E. Supply accessories and minor equipment items needed for a complete system, even if not specifically mentioned herein or on the drawings, without claim for additional payment,

F. Notwithstanding any detailed information in the Contract Documents, it is the responsibility of the Audio/Visual System Contractor to supply systems in full working order, notify the City of Glendale Project Manager or their representative of any discrepancies in part numbers or quantities before bid. Supply items and quantities according to the intent of the Specification and Drawings without claim for additional payment.

G. Obtain all permits necessary for the execution of any work pertaining to the installation, or any operation by the city of Glendale and contractor.

H. Execute all work in accordance with the National Electric code, the National Electrical Safety Code, and all applicable local and State codes, ordinances, and regulations. If a conflict develops between the contract documents and the appropriate codes and is reported to the City of Glendale's Project Manager or their representative prior to bid opening, the City of Glendale's Project Manager or their representative will prepare the necessary clarification. Where a conflict is reported after contract award, propose a resolution of the conflict and, upon approval from City of Glendale's Project Manager or their representative, perform work.

1.3 REFERENCES

A. National Fire Protection Association (N.F.P.A.)

B. National Electrical Code (N.E.C.)

C. American National Safety Institute (A.N.S.I.)

D. Electronics Industries Association (E.I.A)

E. Sound, System Engineering (2nd Edition), Davis and Davis. Howard W. Sams, 1987

F. Audio System - Design and Installation. Giddings, Howard W, Sams, 1990

1.4 SOUND SYSTEM DESCRIPTION

A. Basic design, is to be a DAP based system (Digital Audio Platform) throughout the facility. It is to integrate with Fire Alert and Facility Paging Systems (both zone and complex specific). It is to have Ethernet connection to the City of Glendale's network for remote system control.
   1. The City of Glendale's Project Manager and Audio/Visual Department is to have complete access to the system (passwords, locks, etc.)

B. Basic Equipment to be considered

   1. Media Player/Recorder
      a. All equipment must have RS232 or RS422 control
         (1) CD/DVD player/recorder
         (2) Cassette player/recorder
         (3) VCR player/recorder
         (4) AMX / Crestron Controllable
            (i) IR control is not acceptable
   2. Microphones
      a. Wired microphones
         (1) Lapel
            (i) Microphone Preamp
            (ii) One 25' microphone cable per unit (See Cable & Control Wiring Standards)
         (2) Handheld
            (i) One 25' microphone cable per unit (See Cable & Control Wiring Standards)
      b. Wireless Microphones (Shure "ULX Standard" minimum)
         (1) Lapel
         (2) Headset
         (3) Handheld
   3. Stage setting
      a. Wall Panels, Floor Boxes, Audio/Video connect / tie line panels and multi-pin break-out panels
      b. Break-out snakes (runs to be keep at minimum lengths)
      c. A/C Power (Tech Power)
         (1) See AC Power Systems
         (2) See Room Minimum Standards
   4. Additional inputs
      a. Line level inputs (RCA / 1/4")
      b. RS232
      c. VGA

d. RGB (HV)
e. Ethernet

5. Conferencing
   a. Teleconferencing
   b. Videoconferencing
6. Speaker Quality / SPL
   a. Ceiling mounted, distributed speakers systems
      (1) Must have an 87% minimum room coverage,
   b. Utilize higher quality speakers systems for higher energy events such as dances, live bands, games, videos/movies, etc.
7. Video Projection
   a. See Video Projection Standards
   b. For small rooms up to 50 people projector must be 2000 lumen minimum, contrast Ratio of 450:1 or greater and Resolution of 1280 x 1024 (native) or greater.
   c. For large rooms over 50 people projector must be 6,000 lumen minimum, contrast Ratio of 450:1 or greater and Resolution of 1280 x 1024 (native) or greater
   d. Screen (Front, Rear Projection or motorized)
   e. Video inputs and Control Cabling
      1. RGB (HV)
      2. VGA
      3. Composite video
      4. Line level audio
      5. RS232
      6. Ethernet
8. Theatrical Lighting
   a. See Theatrical Lighting Standards
   b. See Room Minimum Standards

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9. Audio Equipment Rooms
   a. Racks located on concrete floors in equipment rooms or non-finished spaces to mount on a 4-inch wood or concrete riser.
   b. Provide ventilation adequate to keep temperature within the rack below 100degF. Provide additional ventilation vents or fans in each rack if temperature in or around rack rises above 100degF with power on for five continuous hours.
   c. Equipment rack shall be secured and grounded
   d. Floor shall be static free (using asphalt/linoleum tile)
   e. Lighting intensity shall be at least 540 lux (50 footcandles)
   f. Emergency lighting shall be provided
   g. The rated distributed floor loading shall be greater than 12 kPa (250 lbf/ft^2)
   h. The rated concentrated floor loading shall be greater than 4.4 kN (1000 lbf)

i. AC power requirements for equipment racks (see Part 3-Execution, 3.1 General A-F)
j. Equipment room shall include a minimum of (2) convenience 120V AC 20 ampere circuits

10. Audio Equipment Closets
    a. Audio Equipment Closets shall not have door sills or center post. The door shall be installed with a lock. Size 91-cm (36”) W x 2.0-m (80”) H
    b. Conduit(s) and cable tray(s) located in the ceiling shall protrude into the closet 6”
    c. Racks located on concrete floors in equipment closet or non-finished spaces to mount on a 4-inch wood or concrete riser.
    d. The closet temperature shall be maintained at 72°F
    e. Provide ventilation adequate to keep temperature within the rack below 100degF.
    f. Provide additional ventilation vents or fans in each rack if temperature in or around rack rises above 100degF with power on for five continuous hours.
    g. Equipment rack shall be secured and grounded Floor shall be static free (using asphalt/linoleum tile)
    h. Lighting intensity shall be at least 540 lux (50 footcandles)
    i. Emergency lighting shall be provided
    The rated distributed floor loading shall be greater than 12 kPa (250 lbf/ft^2)
    j. The rated concentrated floor loading shall be greater than 4.4 kN (1000 lbf)
    k. AC power requirements for equipment racks (see Part 3-Execution, 3.1 General A-F)
    l. Equipment room shall include a minimum of (2) convenience 120V AC 20 ampere circuits
    m. Equipment closets shall Utiliz Middle Atlantic AXS System for Millwork and In-Wall installation
    n. Rough-in millwork must be plumb, square and completed before beginning assembly. Millwork mounting platform must be minimum 19.25" wide by 18.50" deep for SAX & SSAX models with a 0.50" set back, 19.25" wide by 22.50" deep for AXS & AX-SX models with a 0.50" set back, and 19.25" wide by 28.50" deep for AXS-xx-26 models with a 0.50" set back
    o. The millwork must be constructed in such a manner as to provide a weight capacity greater than the total assembled weight

11. AC Power for larger shows
    a. See AC Power systems
    b. See Room Minimum Standards

B. AC Power Systems

1. Installation Responsibilities. The division of responsibilities between the Audio/Visual system contractor and the electrical contractor is as follows:

   a. The Audio/Visual system contractor is responsible for the installation and routing of power cabling within the sound equipment racks.
   b. The electrical contractor is responsible for provision and installation of all AC power circuits, outlets, power panels (including sequencing power panels when specified) and interconnection of power to the equipment racks.
   c. The electrical contractor is responsible for provision and installation of all Audio system conduit and junction boxes required for all base and alternate bid systems.
   d. All power circuits for the Audio system must have isolated ground receptacles. All power circuits for the sound system will originate from one power panel.

1.5 SUBMITTALS

A. Submit all shop drawings and submittals in accordance with project standards.

B. Shop drawings and submittal data shall contain sufficient information to describe the work to be performed. Drawings shall be executed at an appropriate scale, not smaller than 1/8" = 1'-0". Submit one (1) reproducible mylar set, five (5) black and white sets, and 1 CD-ROM sets of drawings; (blue line or other diazo process copies are not acceptable) submit 2 copies of catalog data sheets (8-1/2" x 11") neatly bound In sets. Submit all Shop Drawing information at one time. Information shall include but not necessarily be limited to:

1. Complete, detailed wiring diagrams for all systems, based on the contract documents and including cable types, identification and color codes, and wiring details of connections, both at equipment and between equipment racks and wiring in conduit.
2. Loudspeaker location, orientation, rigging and aiming details
3. Patch panel layouts and designation (labeling) strips.
4. Drawings describing fabrication of consoles, enclosures, supports, tables, etc.
5. Location of all equipment in racks, consoles, or on tables, with dimensions; wire routing and cabling within housings; AC power outlet and terminal strip locations.
6. Complete shop drawings detailing custom fabricated plates or panels. Drawings to include dimensioned locations of components, component types, engraving information, and plate material and color.
7. A complete plan schedule of proposed construction operations for approval. The schedules of all subcontractors, transportation, storage and all other

matters affecting the work shall be accounted for on the project schedule. Revise and resubmit schedule on a quarterly basis.

8. Representative equipment labeling sizes, styles, and numbering.
9. Schematic drawings of any custom circuitry or equipment modifications, including connector pin-outs and component lists.
10. A material list of all equipment to be furnished, arranged in specification order. This list shall be followed by catalog data sheets, arranged in specification order, of all equipment to be furnished. Where a data sheet shows more than one product, indicate the model being proposed with an arrow or other appropriate symbol.
11. Proposed cable labeling technique.
12. Samples as required in various specification paragraphs.

C. Contract Closeout Submittals

1. Keep a complete set of drawings on the job, note any changes made during installation, and submit 1 corrected set of reproducible mylar drawings showing work as installed. Also include this information in one CD-ROM set submitted to the City of Glendale's Projector Manager.
2. Submit the following data for review, prepared as indicated, at least one week prior to acceptance testing (exceptions noted):
   a. System Reference Manual: Furnish 2 copies, in 3-ring binders, sized to hold the material plus 50 percent excess, with clear vinyl pockets on cover and spine for project title. Provide tabular dividers with permanent legends for the following sections;
      (1) System Operation and Instructions: Prepare a complete and typical procedure for the operation of the equipment as a system, organized by subsystem or activity. This procedure shall describe the operation of all system capabilities. Assume the intended reader of the manual to be technically inexperienced and unfamiliar with this facility.
      (2) A list of all equipment, indicating manufacturer, model, serial number, and equipment rack location. Update following acceptance testing, if changed,
      (3) A list of settings of all semi-fixed controls. This includes power amplifier input gain, comp/limiter settings, etc. Update following acceptance testing.
      (4) Photographically reproduced schematic wiring diagrams of each major sub-system, based on the as-built

documentation, at a reduced scale easy to handle but fully legible. Blue-line (or similar diazo process) prints are not acceptable.

(5) Maintenance Instructions, including installer's maintenance phone number(s) and hours; maintenance schedule; description of products recommended or provided for maintenance purposes, and instructions for the proper use of these products,

(6) Manufacturer's Instruction Manuals for all items of equipment, incorporating or followed by manufacturer's warranty statements. For custom circuits or modifications, a description of the purpose, capabilities, and operation of each item.

(7) Any other pertinent data generated during the project or required for future service.

b. Photographically reproduced as built headend wiring diagrams and overall building wiring diagrams, at a reduced scale easy to handle but fully legible. Blue-line (or similar diazo process) prints are not acceptable. Mount wiring diagrams behind Plexiglas in the equipment racks.

1.6 SUBSTITUTIONS

A. Request for substitutions shall be submitted in writing to the City of Glendale's Project Manager/Representative. Requests shall be submitted no later than 1 week before the bid opening. Confirmation of the acceptance of substitutions shall be issued to all bidders of record as addenda to the Drawings and Specifications and will become part of the Contract Documents. The City of Glendale's Project Manager/Representative will not be responsible for oral clarification.

B. Substitutions after Bid award will only be considered when a Product becomes obsolete or commercially unavailable through no fault of the Contractor.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

1.7 QUALITY ASSURANCE

A. Qualifications and Experience

B. The following criteria will be used as a standard for judging installation qualification and project experience:

1. Installing Contractor to have previously installed jobs of similar magnitude, completed within the last five years. Similar magnitude includes: equal or larger venue size, system cost and complexity. Provide evidence of at least one such completed Job for inspection by the city of Glendale / consultant. Information to include project scope, system description, system cost and references.

2. Installing Contractor to have at least five years experience with equipment and systems of the types specified.

3. The Installing Contractor shall maintain a fully staffed and equipped service facility, and shall be a franchised dealer for the major brands specified,

4. The Installing Contractor shall be properly licensed to work in Glendale, Arizona.

5. The Installing Contractor shall have staffing and computer systems to produce acceptable quality shop drawings and project record documents. Schematic diagrams, speaker location, orientation, rigging, fabrication and layout details to be produced using AutoCAD R14 or later.

C. Contractor Qualification Submittals

Submittals for qualification must include all of the following:

1. A description of the installing contractor's fulfillment of qualifications and experience in all areas listed in the section above.
2. A brief company description outlining company history including how long the company has been in business, the number of personnel employed, etc.
3. Resumes of staff that will be involved in working on the project and their roles. Include education, training, experience, professional societies, and notable contributions to the industry.
4. Representative project list. Include a project description, company personnel who worked on the project with their involvement, and a reference point of contact. Note whether the key personnel involved in these projects are still employed with the company.
5. Samples of project documentation- Include schematic diagrams, speaker orientation and rigging details, panel fabrication details, and any other applicable documentation.

1.8 PROJECT CONDITIONS

A. Verify all conditions on the job site applicable to this work. Notify City of Glendale/Representative. in writing of discrepancies, conflicts, or omissions promptly upon discovery.

B. The drawings diagrammatically show cables, conduit, wiring, and arrangements of equipment fitting the space available without interference. If conditions exist at the job site which make it impossible to install work as shown, recommend solutions and/or submit drawings to the City of Glendale's Project Manager/ Representative for approval, showing how the work shall be installed.

1.9 ACCEPTANCE TESTING

A. Upon completion of installation and initial tests and adjustments specified in part 3, acceptance testing shall be performed by the City of Glendale's Audio / Visual Department Staff or representative.

B. Provide personnel familiar with all aspects of the system to assist during acceptance testing in accordance with part 3 of this specification.

C. The process of acceptance testing the system shall necessitate moving and adjusting certain component parts; perform such adjustments without claim for additional payment.

1.10 WARRANTY

A. Installer shall warrant equipment to be free of defects in materials and workmanship for not less than one year after date of Final Acceptance. Defects occurring in labor or materials within one-year warranty shall be rectified by replacement or repair. Within the warranty period, provide answer to service calls and requests for information within a 24-hour period, and repair or replace any faulty item within a 72-hour period without charge, including parts and labor.

B. This warranty shall not void specific warranties issued by manufacturers for greater periods of time. Nor shall it void any rights guarantied to the City of Glendale by law.

C. Contractor to provide city of Glendale's Project Manager/ Representative with exact beginning and ending dates of the warranty period. Include the name of the person to call for service and telephone number. This information to be part of Project Record Drawings.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Model numbers and manufacturers included are listed as a standard of quality. Specific model will be dependant on the needs of the facility with final approval by the City of Glendale. Equivalent, substitutions shall be approved by the City of Glendale's Project Manager in writing. Any proposed substitutions shall meet all specifications of the specified equipment. Proposed equivalent substitutions approved in

writing by the City of Glendale's Projector Manager will be considered acceptable substitutions.

B. Other qualified manufacturers will be considered subject to approval by City of Glendale's Standards Committee with the equipment's full specification and complete technical data.

2.2 GENERAL

A. All equipment and materials shall be new and shall conform to applicable UL, CSA, or ANSI provisions. Take care during installation to prevent scratches, dents, chips, etc. Damaged equipment shall be replaced with new equipment at no cost to the City of Glendale.

B. Regardless of the length or completeness of the descriptive paragraph herein, each device shall meet all of its published manufacturer's specifications. Verify performance as required. Where two or more acceptable products are listed, the Installer shall use either at his option.

C. Install all rack mounted equipment with black 10-32 button head machine screws with Phillips drive unless otherwise specified.

D. Provide security covers on all non-user-operated equipment having front panel controls. Install covers at the conclusion of Acceptance Testing as described in Part 3.

E. Provide engraved lamicoid labels at the front and rear of all signal processing equipment mounted in racks. Mount labels on the equipment and attach in a neat, plumb, and permanent manner. Embossed labels will not be accepted. Provide engraved labels at the rear only of equipment mounted in furniture consoles.

F. Custom rack panels shall be 1/8-inch thick aluminum, standard EIA sizes, brushed black anodized finish unless otherwise noted (Brush in direction of aluminum grain only). Custom connector plates (speaker, microphone, etc.) are typically stainless steel, however, it is the installer's responsibility to verify plate finish with the City of Glendale, plastic plates will not be accepted.

G. All engraving shall be 1/8-inch block sans serif characters unless noted otherwise. On dark panels or pushbuttons, letters shall be white; on stainless steel or brushed natural aluminum plates, or light-colored pushbuttons, letters shall be black.

H. Mount trim potentiometers, custom circuit cards, relays, and transformers (except large 70V units) in shielded enclosures, and mark their function and connections with engraved lamicoid labels.

I. In accordance with IEC-268 standard, all XLR connectors shall be wired pin 2 hot (high), pin 3 low, and pin 1 screen (shield).

J. All patch panels shall be wired so that signal "sources" (outputs from devices) appear on the upper row of a row pair; all "loads" (inputs to devices) appear on the lower row of a row pair, All patch panel designation strips shall utilize alphanumeric and descriptive labels. The jack positions in each horizontal row shall be numbered sequentially from left to right. The horizontal jack rows shall be lettered sequentially from top to bottom. The alphanumeric identification of each jack shall be included on the functional block drawings.

K. All headend passive devices shall be mounted on 3/4" marine graded plywood, painted black and treated to be fire resistant. Plywood shall be mounted in headend equipment rack, or on an adjacent wall.

EQUIPMENT

A. Audio Equipment Racks
1. Verify space requirements and coordinate location with City of Glendale.
2. Verify that enclosure will provide proper cooling for rack mounted equipment.
3. Provide Raxxess rack power strip for each equipment rack. Each rack power strip shall be customized for that rack's branch circuit requirements.
4. Each equipment rack shall be:
   a. One Middle Atlantic MRK series (including vented rear door), with sides, top with fans, and copper bus bar.

B. Power Amplifier
1. Each amplifier to have an engraved lamicoid strip, on front and rear, stating amplifier number and which speaker zone it is feeding.
2. Type Power Amplifier
   a. Crown
      1. CTS, Micro-Tech, Macro-Tech
      2. D series, Studio Reference series
   b. IMP (optional for distributed power amp/speaker system. Where power amp is to be mounted on speaker)

C. Install Audio Mixer (DSP)

1. Each mixer & input or output expansion device to have an engraved lamicoid strip, on front and rear, stating device number.
2. Type of mixer
   a. BiAmp AudiaFlex (Digital Audio Platform)
      (1) Input/Output requirements to be determined from facility's programming requirments.
   b. Type of input/output expansion device
      (1). BiAmp AudiaEXPI (input) or AudiaEXPO (output)

c. CobraNet switches to be of a BiAmp approved device to work with BiAmp Audia systems (model depends on needs and approval by City of Glendale; coordinate with City of Glendale IT department)

D. Portable Audio Mixers
1. Analog Type
   a. Minimum small format Standard
      1. MACKIE : 1402-VLZ Pro, 1604-VLZ Pro, SR32•4 VLZ Pro.
   c. Minimum Medium format Standard
      (1) Midas Venice: 160, 240, 320
   d. Minimum Large format Standard
      (1) Midas Legend 3000
2. Digital Type
   a. Minimum small format Standard
      1. Yamaha : O1V 96V2

   e. Minimum Medium format Standard
      (1) Yamaha O2R 96V2, DM1000V2, DM200V2
   f. Minimum Large format Standard
      (1) Yamaha PM5D, PM1D, DigicoD5

E. Speakers

1. Ceiling mounted speaker
   a. JBL Control Series (26C/CT)
   b. Tannoy (CMS8-TDC)
   c. Atlas Sound (FAP62T)
   d. EVID C8.2
2. Wall mounted (i.e.: dance studio, exercise area's, etc.; where higher quality & SPL is needed)
   a. JBL Control Series (JBL AM4212/64)
   b. EV ZX4
   c. EAW (JFX100)
   d. MacPherson (M12C, M2X)
3. Outdoor Install
   a. Sporting area's Community (R. series)
      (1) Large open fields/areas, and Pools
   b. Leisure area's IMP, OWI, Soundtube

F. Equalizers (Portable)
1. Ashly Potea 4.24G (Digital)
2. Klark Teknik Helix (Digital)

G. Cross-overs
1. Ashly Potea 4.24C (digital)
   a. Ashly 4.24D will not be accepted
2. Klark Teknik DN9848

H. Compressors/Limiter/Gates
1. DBX 1066
2. Drawmer DS201, DS404, DL241, DL441

I. Effect Processors
1. Yamaha: SPX2000, SRev1
2. TC Electronics: M-ONEXL, D-TWO
3. Eventide H8000, Eclipse-3.1

2.3 INPUT PANELS AND FLOOR BOXES

A. Approved Connector types to be used:
   1. Panel Mount Connectors
      a. All to be Switchcraft rectangular housing unless otherwise approved by city.
      b. All speaker connectors to be Speakon: Neutrik NL4MP (rectangular panel mount)
      c. Milti-pin connectors (Hinge kit must be used)
         1. Horizon Pro-58 (Horizon CL2 58 pr cable, Whirlwind W58PRFLX only)
         2. Whirlwind W4c, W4i, (Horizon CL2 58 pr cable Whirlwind W58PRFLX only), W6CRP, W6IRP (Horizon CL2 28 pr, Whirlwind W28PR)
            a. W3W4AK Large hinge kit for W3, W4
            b. W5W6AK Small hinge kit for W5, W6
         (3) All connectors to be fully terminated
   2. Cable Mount Connectors
      a. XLR: Switchcraft A3F/A3M
      b. Switchcraft connectors unless otherwise noted or approved by city.
      c. Speakon: Neutrik NL4FC

B. Wall Panels
   1. Panels to be black with engraved lettering filled with white paint.

C. Stage Floor Boxes
   1. All panels loaded in floor box are to be engraved.
   2. Coordinate lid type and finish with city.
      a. Ace Backstage SuperPocket or equivalent to be approved by City of Glendale.

2.4 CABLE AND CONTROL WIRING

A. Electrical conductors, except where otherwise specified, shall be soft drawn annealed stranded copper having a conductivity of not less than 98% of pure copper- Acceptable Cables:

   1. Microphone Level Cable:
      a. Install: Belden 8451. Belden 9451, or West Penn 291.
      b. Microphone Cords: Horizon Lo-Z5 , Belden 8208 or better. (2/c 20ga.; Switchcraft A3F/A3M connectors)
   2. Line Level Cable: Belden 8451 or Belden 9451, or West Penn 291.
   3. Speaker Level Audio: 10, 12, 14 AWG jacketed twisted pair. West Penn C210, 227, 225.

   4. Intercom Cable: Belden 8760 or Belden 9460 or West Penn 293.
   5. Audia Select & Volume controls
      Typical Gepco UNC220 or equivalent

2.5 POWER CONTROL SYSTEM

A. Power Delay Sequencer when required
   1. Contractor to configure sequencer so that line level equipment is powered on before amplifiers. Process to be reversed for power off.
   2. Provide on/off control stations at amplifier rack and other locations to be coordinated with city's Project Manager.
   3. All power circuits for the sound system must have isolated ground receptacles, All power circuits will be powered from one transformer.
   4. Sequencer to be provided and installed by Electrical Contractor.
      a. Lyntec MSP Series or equivalent upon approval by city.

PART 3 - EXECUTION

3.1 GENERAL

A. Coordinate work with other trades to avoid causing delays in construction schedule,

B. Mount equipment and enclosures plumb and square. Permanently installed equipment to be firmly and safely held in place. Design equipment supports to support loads imposed with a safety factor of at least three. Seismic bracing shall be installed on appropriate equipment to comply with seismic requirements.

C. The process of acceptance testing the System shall necessitate moving and adjusting certain component parts including loudspeakers. Provide for +/-5deg of adjustability from initial aiming angle and perform such adjustments without claim for additional payment,

D. Cover edges of cable pass-through holes in chassis, racks, boxes, etc., with rubber or nylon grommets.

E. AC Power and Grounding

   1. Coordinate final connection of power and ground wiring to racks. Hardwire power wiring directly to internal AC receptacles to ensure uninterrupted operation.
   2. Install 3-conductor, isolated ground, 20A, 120VAC outlets in each rack. Provide a minimum of two spare outlets in each rack. Install 30A twist-lock outlets where needed. Label each outlet as to which AC circuit is feeding it and provide the same information in the circuit breaker panel.

   3. Ground equipment chassis not having a three wire power cord to copper bus bar in each rack. If bus bar is threaded, use screws (minimum size is 10/32) with No. 12 Wire. If bus bar is not threaded, use 6/32 nuts, bolts and locking washers with No. 12 wire. Crimp or solder wire to eyelet to connect to screw or bolt. Connect green

ground wire from each AC outlet in rack to this buss bar. Connect each rack buss bar to main ground wire in local power panel with properly sized insulated cable.

F. Equipment Racks

1. Mount equipment in racks and consoles and fully wire and test before delivery to job site. If field conditions prevent prior assembly of racks, notify City's Projector Manager in writing that racks will be fabricated on site and the reasons for the change. Racks located on concrete floors in equipment rooms or non-finished spaces to mount on a 4-inch wood or concrete riser.
2. Provide ventilation adequate to keep temperature within the rack below 100degF. Provide additional ventilation vents or fans in each rack if temperature in or around rack rises above 100degF with power on for five continuous hours.
3. Provide a fluorescent lamp fixture mounted in the top of each rack for illumination during equipment servicing.
4. Looking at the rack from the rear, locale AC power wiring on the Right; line level audio, video, and RF wiring on the Left. Panels or equipment mounted on the rear rack rails shall not block access to any front mounted components.

G. System Wiring

1. Take precautions to prevent and guard against electromagnetic and electrostatic hum. For line level audio signals, float cable shields at the output of source device. Shields not connected to be folded back over cable jacket and covered with heat-shrink tubing. Do not cut off unused shields.
2. Exercise care in wiring; damaged cables or equipment will not be accepted. Isolate cables of different signals or different levels, and separate, organize, and route to restrict channel cross-talk or feedback oscillation in any amplifier section. Keep wiring separated into groups for microphone level circuits, line level circuits, loudspeaker circuits, and power circuits,
3. Make joints and connections with rosin-core solder or with mechanical connectors approved by the city, where spade lugs are used, crimp properly with ratchet type tool. Spade lugs mounted on 20 gauge or smaller cable to be soldered after crimping.
4. Execute wiring in strict adherence to:
   a. "standard broadcast practices." as excerpted from "Recommended Wiring Practices." Broadcast Audio Equipment for AM, FM, Television (5th Edition), Radio Corporation of America (RCA). Camden, NJ 1962
   b. Kenneth T. Deschler. Cable Television Technology. New York: McGraw-Hill, Inc., 1987

c. Phillip Giddings. Audio System Design and Installation. Indianapolis:Howard W. Sams & Co., 1990
d. Don Davis and Carolyn Davis, Appendix II. Recommended Wiring Practices. In Sound System Engineering, 2nd Edition. Indianapolis: Howard W. Sams & Co., 1989
e. In accordance with standard professional practice

5. Wiring entering equipment racks should connect via terminal blocks; terminal blocks shall be fully exposed, labeled, and mounted on 3/4 inch plywood board painted flat black. If quantity of terminals is too numerous to fit in rack, terminal blocks shall be located on wall mounted plywood terminal board adjacent to rack or mounted on the inside of rear rack door if equipped with rear door. Mounting boards to be 3/4 inch marine graded or hardwood plywood painted flat black. Terminal board wiring to meet the same requirements as internal rack wiring described below.
6. Route unbroken microphone, audio, line, and control wiring from receptacle plate/chassis to patch panel/rack. Remove spliced cables and replace without additional charge to the city of Glendale.
7. Connect cable to active components through screw terminal connections and spade lugs whenever available. Make connections to speaker transformers with properly sized closed end connectors crimped with factory approved ratchet type tool. Wire nut or "Scotchlock" connectors are not acceptable. Do not wrap audio cable splices or connections with adhesive backed tape.
8. Run vertical wiring inside rack in properly sized slotted wall wiring duct with snap-on covers (Panduit Type E series). Mount raceways on full length 3/4 Inch marine grade plywood backboards attached to rack sides. Horizontal wiring in rack to be neatly tied in manageable bundles with cable lengths cut to minimize excess cable slack but still allow for service and testing. Provide horizontal support bars if cable bundles sag. Neatly bundle excess AC power cable from rack mounted equipment with plastic cable ties. Rack wiring to be bundled with plastic cable ties or lacing twine. Electrical tape and adhesive backed cable tie anchors are not acceptable.
9. Connect loudspeakers electrically in phase, using the same wire color code for speaker wiring throughout the project.
10. Provide adequate service loops so that equipment mounted on rack slides shall be pulled fully out, to their locked position, without straining cable.
11. Wiring and connections shall be completely visible and labeled in rack. Termination resistors shall be 1 percent tolerance; fully visible and not concealed within equipment or connectors.

12. Isolate cables carrying signals at different levels and separate to restrict channel bleed-through and feedback oscillation in any amplifier section.
13. Keep wiring separated into five groups of conduit provided for microphone level circuits (level below -20 dBm). line level circuits (up to +30 dBm), loudspeaker circuits (above +30 dBm), video, and power circuits.
14. Isolate all wiring from conduit ground.

H. Equipment and Cable Labeling

1. Provide engraved lamicoid labels on the front and rear of active equipment mounted in racks. Mount labels in a neat. plumb and permanent manner. Embossed labels are not acceptable. Equipment labels to have at least two lines of engraving with the first line listing the schematic reference of the device. The bottom line to indicate what other devices or areas this equipment controls, i.e., FEEDS CENTER CLUSTER/RIGHT SPEAKER .
2. Provide an engraved label over each user-operated control that describes the function or purpose of the control. Label size to be adjusted to fit available space.
3. Engraved labels to have 1/8 inch high characters minimum. Labels to be black with white characters except where indicated.
4. Cables and wiring to be logically, legibly, and permanently labeled for easy identification. Labels on cables to be adhesive strip-type covered with clear heat-shrink tubing. Hand-written labels are not acceptable.
5. Wiring designations to be an alpha-numeric code that is unique for each cable. Locate the cable designation at the start and end of each cable run and within 2 inches of the point of termination or connection. For cable runs that have intermediate splice points, the cable shall have the same designation throughout with an additional suffix to indicate each segment of the run. Actual cable designation assignments to be determined by Contractor. Add cable designation codes to system schematic drawings included with Project Record Drawings.
6. Label each terminal strip with a unique identification code in addition to a numerical label for each terminal. Show terminal strip codes on system schematic drawings included with Project Record Drawings.
7. Provide adhesive labels on the rear of equipment where cables attach to indicate the designation of the cable connected at that point.

3.2 CONTRACTOR TESTS AND ADJUSTMENTS

A. Verify the following before beginning actual tests and adjustments on the system

1. Electronic devices are properly grounded,
2. Powered devices have AC power from the proper circuit and hot, neutral, and ground conductors are connected correctly.

3. Insulation and shrink tubing are present where required.
4. Dust, debris, solder splatter, etc. is removed.
5. Cable is dressed, routed, and labeled; connections are consistent with regard to polarity.

B. Preparation for Acceptance, prior to final inspection

1. Temporary facilities and utilities shall be properly disconnected, removed and disposed of off-site.
2. All systems, equipment and devices shall be in full and proper adjustment and operation, and property labeled and identified.
3. All materials shall be neat, clean and unmarred, with parts securely attached.
4. All broken work, including glass, raised flooring and supports, ceiling tiles and supports, walls, doors, etc. shall be replaced or properly repaired, and debris cleaned up and discarded.
5. All extra materials, portable equipment, and spares shall be delivered and stored at the premises as directed.

C. Grounding System Tests

1. Measure and record the DC resistance between the technical ground in any equipment rack or console and the main building ground. Resistance should be 0.15 ohms or less.
2. Temporarily lift the technical ground from the main electrical ground, measure and record the DC resistance between them. Resistance should be greater than 1000 ohms.

D. Audio System Tests

Perform the following tests and adjustments, supplying test equipment required- Follow EIA Standards RS-160 and RS-219 in performing tests- Make corrections necessary to bring system(s) into compliance with the specifications.

1. Measure and record the impedance of each loudspeaker/speaker line circuit terminating at the equipment rack. Use 100 Hz for low frequency speakers. 1 k Hz for mid-range speakers, 4k Hz for high frequency horns. For full range devices. use 1 k Hz.

2. Check system to assure freedom from oscillation or stray RF pickup. Check each input without signal and detect unwanted signals on oscilloscope at speaker termination in rack.
3. Check polarity of loudspeakers with an electronic polarity checker and by applying music program or constant power per octave (pink noise) signal to system while walking through the transition areas of coverage from one loudspeaker to the next. Transition should be smooth with no apparent shift in source from one speaker to the next.
4. Apply sine wave sweep signal to each loudspeaker system, sweeping from 50 Hz to 5kHz and at a level 10 dB below full amplifier output, and listen for rattles or noise. Correct if apparent.

3.3 ACCEPTANCE

A. Acceptance testing will include operation of each major system and any other components deemed necessary. Contractor will assist in this testing. Contractor shall provide at least two technicians familiar with the Installation, available for the entire testing period (day and night), to assist in tests, adjustments, and final modifications. Tools and materials required to make any necessary repairs, corrections, or adjustments shall be furnished by the Contractor.

B. Provide two portable UHF business band radios for use during acceptance testing. Radios should have a transmission range sufficient to cover entire project. Radios to include rechargeable batteries and charger along with "holster" for wearing on belt. Radios to be available for duration of testing process, including any follow-up visits required prior to final acceptance. Confirm that radio frequencies used are not in use elsewhere on project site.

C. The following procedures will be performed by the City of Glendale / Representative on each System;

1. The audio fidelity test shall consist of driving the system with pink noise and measuring the response from 50 Hz to 16k Hz. Parametric filters will be used to adjust the response of the system (s) to fit the requirements of the space.
2. Control functions shall be checked for proper operation, from controlling devices to controlled devices.
3. Adjust, balance, and align equipment for optimum quality and to meet the manufacturer's published specifications. Establish and mark normal settings for each level control, and record these settings, in the "System Operation and Maintenance Manual".
4. Installed, spare, and loose equipment will be inventoried for correct quantity.
5. Any other test on any piece of equipment or system deemed appropriate.

D. In the event the need for further adjustment or work becomes evident during equalization or acceptance testing, the Contractor will continue his work until the system is acceptable at no addition to the contract price. If final acceptance is delayed because of defective equipment, or failure of equipment, or if installation fails to meet the requirements of these specifications, the Contractor will pay for any additional cost that the City of Glendale may incur to complete system.

3.4 INSTRUCTION OF CITY PERSONNEL

A. Provide one technician on site for 1 day (eight hours) for instruction to city designated personnel on the use and operation of the System, scheduled by an instructor fully knowledgeable and qualified In system operation. Videotape all training

sessions. The System Reference Manuals should be complete and on site at the time of this instruction.

B. The lead technician for the project installation should be present at the first formal use of the system.

END OF SECTION

02 Specification for Video Projection Equipment

VIDEO PROJECTION

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Work includes all (labor, materials, tools, transportation services, supervision, coordination, etc., necessary to complete the installation of the audiovisual system, as described In these specifications and illustrated on the associated drawings. The system includes the following major items:
   1. Video Projectors, Video Screens, Mirrors, Projection Sources and associated equipment.
   2. Modulators, Processors, Demodulators. Tuners, Mixers, Equalizers, Amplifiers, Program Sources, and other video, audio, and RF signal processing equipment.
   3. Equipment Racks, Portable Cabinetry, and Furniture.
   4. Control Equipment.
   5. Video Recorders. Players. Monitors, Switchers, and Distribution Equipment.
   6. Cables, Multi-taps. Connectors, Plates, and Wiring.

B. The contract also includes:
   1. Verification of dimensions and conditions at the job site.
   2. Preparation of submittal information.
   3. Installation in accordance with the contract documents, manufacturer's recommendations, and all applicable code requirements.
   4. Initial tests and adjustments, written report, and documentation.
   5. Instruction of operating personnel; preparation of user manuals.
   6. Maintenance services; warranty.

C. This contract will be administered by the City of Glendale’s Project Manager/Representative.

1.2 RESPONSIBILITY AND RELATED WORK

A. Coordinate work with the City of Glendale’s Project Manager , General Contractor, Electrical Contractor, and the scheduled work of other trades.

B. The AV Contractor shall supply any custom boxes for installation by the electrical contractor.

C. Conduit, wall boxes, pull boxes, and junction boxes are provided and installed by the electrical contractor. AC Power circuits and ground wiring are provided and installed by the electrical contractor. This does not, however, relieve the AV Contractor from responsibility for a complete working system. Coordination with the Electrical Contractor is required to achieve a proper conduit system.

D. AC Power circuits shall be distributed within the AV system racks by the AV Contractor.

E. Supply accessories and minor equipment items needed for a complete system, even if not specifically mentioned herein or on the drawings, without claim for additional payment.

F. Notwithstanding any detailed information in the Contract Documents, it is the responsibility of the AV Contractor to supply systems in full working order. Notify the City of Glendale's Project Manger of any discrepancies in part numbers or quantities before bid. Supply items and quantities according to the intent of the Specification and Drawings without claim for additional payment.

G. Obtain all permits necessary for the execution of any work pertaining lo the installation, or any operation by the owner and contractor.

H. Execute all work in accordance with the National Electric code, the National Electrical Safety Code, and all applicable local and State codes, ordinances, and regulations. If a conflict develops between the contract documents and the appropriate codes and is reported to the City of Glendale's Project Manager or their representative prior to bid opening, the City of Glendale's Project Manager or their representative will prepare the necessary clarification. Where a conflict is reported after contract award, propose a resolution of the conflict and, upon approval from City of Glendale's Project Manager or their representative, perform work.

1.3 REFERENCES

A. National Fire Protection Association (N-F.P.A.)

B. National Electrical Code (N.E.C.) and California Electric Code (C.E.C.)

C. American National Safety Institute (A-N.S.I.)

D. Electronics Industries Association (E-I.A)

E. Sound System Engineering (2nd Edition), Davis and Davis. Howard W, Sams, 1987

F. Audio System - Design and Installation. Giddings. Howard W. Sams, 1990

G. Cable Television Technology. Kenneth T. Deschler, New York: McGraw-Hill, Inc., 1987

1.4 SYSTEM DESCRIPTION

A. Rear Video Projection System

1. Rear projection systems will consist of the following:
   a. Rear projection screens will be mounted on either side of the stage area providing graphics and video projection for the room. These screens will be permanently mounted in walls.
   b. Video projectors will be mounted behind the screens.

B. Front Video Projection System
1. Front projection systems will consist of the following:

   a. Front projection screens will be mounted on either side of the staging area for larger rooms or centered in optimum viewing area for smaller rooms, providing graphics and video projection for the room. These screens will be permanently mounted in walls or hanging from the ceiling and motorized.
      b. Video projectors will be ceiling mounted in front of the screens.

C. Video Source Systems
1. Video sources will include a PC type computer running presentation graphics software. Other sources may include a VHS/SVHS format VCR and a DVD player.
   a. To be wired with best resolution possible. Composite video is a last resort.

D. AC Power Systems

1. Installation Responsibilities

The division of responsibilities between the AV Contractor and the electrical
contractor is as follows:

   a. The AV Contractor is responsible for the installation and routing of power cabling within the AV equipment racks.
   b. The electrical contractor is responsible for provision and installation of all AC power circuits, outlets, power panels (including sequencing power panels when specified) and interconnection of power to the AV equipment racks.
   c. The electrical contractor is responsible for provision and installation of all AV system conduit and junction boxes required for all base and alternate bid systems.

1.5 SUBM1TTALS

A. Submit all shop drawings and submittals in accordance with project standards. Quantities listed herein are the minimum required of this contractor.

B. Shop drawings and submittal data shall contain sufficient information to describe the work to be performed. Drawings shall be executed at an appropriate scale, not smaller than 1/8" = 1'-0". Submit one (1) reproducible mylar set, five (5) black and white sets. and 1 CD-ROM sets of drawings; (blue line or other diazo process copies are not acceptable) submit 2 copies of catalog data sheets (8-1/2" x 11") neatly bound in sets. Submit all Shop Drawing information at one time. Information shall Include but not necessarily be limited to:

1. Complete, detailed wiring diagrams for all systems, based on the contract documents and including cable types, identification and color codes, and wiring details of connections, both at equipment and between equipment racks and wiring in conduit.
2. MATV system layout showing alt trunk, lateral, drop distributions, including channel levels at all drops at 295.25 MHz,
3. Video projector location, orientation, rigging and aiming details
4. Patch panel layouts and designation (labeling) strips,
5. Drawings describing fabrication of consoles, enclosures, supports, tables, etc.
6. Location of all equipment in racks, consoles, or on tables, with dimensions; wire routing and cabling within housings; AC power outlet and terminal strip locations.
7. Complete shop drawings detailing custom fabricated plates or panels. Drawings to include dimensioned locations of components, component types, engraving Information, and plate material and color.
8. A complete plan schedule of proposed construction operations for approval. The schedules of all subcontractors, transportation, storage and all other matters affecting the work shall be accounted for on the project schedule. Revise and resubmit schedule on a quarterly basis.
9. Representative equipment labeling sizes, styles, and numbering.
10. Schematic drawings of any custom circuitry or equipment modifications, including connector pin-outs and component lists.
11. A material list of all equipment to be furnished arranged in specification order. This list shall be followed by catalog data sheets, arranged in specification order, of all equipment to be furnished. Where a data sheet shows more than one product, indicate the model being proposed with an arrow or other appropriate symbols.
12. Proposed cable-labeling technique.
13. Samples as required in various specification paragraphs.

C. Contract Closeout Submittals

1. Keep a complete set of drawings on the job, note any changes made during installation, and submit 1 corrected set of reproducible mylar drawings showing Work as installed- Also include this information in one CD-ROM set submitted to the City of Glendale.
2. Submit the following data for review, prepared as indicated, at least one week prior to acceptance testing (exceptions noted):
   a. System Reference Manual: Furnish 2 copies, in 3-ring binders, sized to hold the material plus 50 percent excess, with clear vinyl pockets on cover and spine for project title. Provide tabular dividers with permanent legends for the following sections:
      (1) System Operation and Instructions: Prepare a complete and typical procedure for the operation of the equipment as a system, organized by subsystem or activity. This procedure shall describe the operation of all system capabilities. Assume the intended reader of the manual to be technically Inexperienced and unfamiliar with this facility,

      (2) A list of all equipment, indicating manufacturer, model, serial number, and equipment rack location. Update following acceptance testing, if changed.
      (3) A list of settings of all semi-fixed controls. Update following acceptance testing.
      (4) Photographically reproduced schematic wiring diagrams of each major sub-system, based on the as-built documentation, at a reduced scale easy to handle but fully legible. Blue-line (or similar diazo process) prints are not acceptable.
      (5) Maintenance Instructions, including Installer's maintenance phone number(s) and hours; maintenance schedule; description of products recommended or provided for maintenance purposes, and instructions for the proper use of these products.
      (6) Manufacturer's Instruction Manuals for all items of equipment, incorporating or followed by manufacturer's warranty statements. For custom circuits or modifications, a description of the purpose, capabilities, and operation of each item.

(7) Any other pertinent data generated during the project or required or future service.

b. Photographically reproduced as-built headend wiring diagrams and overall building wiring diagrams, at a reduced scale easy to handle but fully legible. Blue-line (or similar diazo process) prints are not acceptable. Mount wiring diagrams behind Plexiglas in the equipment racks.

1.6 SUBSTITUTIONS

A. Request for substitutions shall be submitted using the form contained in this document package. Requests shall be submitted to the City of Glendale's Project Manager/Representative no later than 1 week before the bid opening. Confirmation of the acceptance of substitutions shall be issued to all bidder of record as addenda to the Drawings and Specifications and will become part of the Contract Documents. The City of Glendale's Project Manager/Representative will not be responsible for oral clarification.

B. Substitutions after Bid award will only be considered when a Product becomes obsolete or commercially unavailable through no fault of the Contractor.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

1.7 QUALITY ASSURANCE

A. Qualifications and Experience

B. The following criteria will be used as a standard for judging installation qualification and project experience:

1. Installing Contractor to have previously installed jobs of similar magnitude, completed within the last five years. Similar magnitude includes: equal or larger venue size. system cost and complexity. Provide evidence of at least one such completed job for inspection by the City of Glendale/Representative. Information to include project scope, system description, system cost, and owner and consultant references.
2. Installing Contractor to have at least five years experience with equipment and systems of the types specified.
3. The Installing Contractor shall maintain a fully staffed and equipped service facility, and shall be a franchisee! dealer for the major brands specified.
4. The Installing Contractor shall be properly licensed to work in Phoenix, Arizona.

5. The Installing Contractor shall have staffing and computer systems to produce acceptable quality shop drawings and project record documents. Schematic diagrams, speaker location, orientation, rigging, fabrication and layout details to be produced using AutoCAD R14 or later.

C. Contractor Qualification Submittals
Submittals for qualification must include all of the following:

1. A description of the installing contractor's fulfillment of qualifications and experience in all areas listed in the section above,
2. A brief company description outlining company history including how long the company has been in business, the number of personnel employed, etc.
3. Resumes of staff that will be involved in working on the project and their roles. Include education, training, experience, professional societies, and notable contributions to the industry.
4. Representative project list. Include a project description, company personnel who worked on the project with their Involvement, and a reference point of contact. Note whether the key personnel involved in these projects are still employed with the company.
5. Samples of project documentation. Include schematic diagrams, speaker orientation and rigging details, panel fabrication details, and any other applicable documentation.

1.8 PROJECT CONDITIONS

A. Verify all conditions on the job site applicable to this work. Notify City of Glendale’s Project Manager in writing of discrepancies, conflicts, or omissions promptly upon discovery.

B. The drawings diagrammatically show cables, conduit, wiring, and arrangements of equipment fitting the space available without Interference. If conditions exist at the job site which make it impossible to install work as shown, recommend solutions and/or submit drawings to the City of Glendale’s Project Manager/Representative for approval, showing how the work shall be installed.

1.9 ACCEPTANCE TESTING

A. Upon completion of installation and initial lists and adjustments specified in part 3, acceptance testing shall be performed by the City of Glendale/representative.

B. Provide personnel familiar with all aspects of the system to assist during acceptance testing in accordance with part 3 of this specification.

C. The process of acceptance testing the system shall necessitate moving and adjusting certain component parts; perform such adjustments without claim for additional payment.

1.10 WARRANTY

A. Installer shall warrant equipment to be free of defects in materials and workmanship for not less than one year after date of Final Acceptance- Defects occurring in labor or materials within one-year warranty shall be rectified by replacement or repair. Within the warranty period, provide answer to service calls and requests for information within a 24-hour period, and repair or replace any faulty item within a 72-hour period without charge, including parts and labor.

B. This warranty shall not void specific warranties issued by manufacturers for greater periods of time. Nor shall it void any rights guarantied to the City of Glendale by law.

C. Contractor to provide City of Glendale Project Manager/Representative with exact beginning and ending dates of the warranty period. Include !he name of the person to call for service and telephone number. This information to be part of Project Record Drawings.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Model numbers and manufacturers included in this specification are listed as a standard of quality. Specific model will be dependant on the needs of the facility and approval of the City of Glendale's Project Manager. The City of Glendale's Project Manager shall approve equivalent substitutions in writing. Any proposed substitutions shall meet all specifications of the specified equipment- Proposed equivalent substitutions approved in writing by the City of Glendale's Project Manager/Representative will be considered acceptable substitutions.

B. Other qualified manufacturers will be considered subject to submittal of complete technical data and approval by City of Glendale.

2.2 GENERAL

A. All equipment and materials shall be new. and shall conform with applicable UL, CSA, or ANSI provisions. Take care during installation to prevent scratches,

dents, chips, etc-Damaged equipment shall be replaced with new equipment at no cost to the owner.

B. Regardless of the length or completeness of the descriptive paragraph herein, each device shall meet all of its published manufacturer's specifications. Verify performance as required. Where two or more acceptable products are listed, the Installer shall use either at his option.

C. Install all rack mounted equipment with black 10-32 button head machine screws with Phillips drive unless otherwise specified.

D. Provide security covers on all non-user-operated equipment having front panel controls. Install covers at the conclusion of Acceptance Testing as described in Part 3.

E. Provide laminated or engraved lamicoid labels at the front and rear of all signal processing equipment mounted in racks. Mount labels on the equipment and attach in a neat, plumb, and permanent manner. Embossed labels will not be accepted. Provide engraved labels at the rear only of equipment mounted in furniture consoles.

F. Custom rack panels shall be 1/8-inch thick aluminum, standard EIA sizes, brushed black anodized finish unless otherwise noted (Brush in direction of aluminum grain only). Custom connector plates (speaker, microphone, etc.) are typically stainless steel; however, it is the Installer's responsibility to verify plate finish with the Consultant. Plastic plates will not be accepted.

G. All engraving shall be 1/8-inch block sans serif characters unless noted otherwise. On dark panels or pushbuttons, letters shall be white; on stainless steel or brushed natural aluminum plates, or light-colored pushbuttons, letters shall be black.

H. Mount trim potentiometers, custom circuit cards, relays, and transformers (except large 70V units) in shielded enclosures, and mark their function and connections with engraved lamicoid labels.

I. In accordance with IEC-268 standard, all XLR connectors shall be wired pin 2 hot (high) pin 3 low, and pin 1 screen (shield).

J. All patch panels shall be wired so that signal "sources" (outputs from devices) appear on the upper row of a row pair; all "loads" (inputs to devices) appear on the lower row of a row pair. All patch pane! designation strips shall utilize alphanumeric and descriptive labels. The jack positions In each horizontal row shall be numbered

sequentially from left to right. The horizontal jack rows shall be lettered sequentially from top to bottom. The alphanumeric identification of each jack shall be included on the functional block drawings.

K. All headend passive devices shall be mounted on 3/4" marine graded plywood, painted black and treated to be fire resistant. Plywood shall be mounted in headend equipment rack, or on an adjacent wall.

2.3 MAIN VIDEO PROJECTOR SYSTEMS

A. Rear Projection Screens
1. Verify screen requirements including screen opening dimensional requirements.
2. Coordinate screen size with Architect
3. Coordinate screen mounting requirements and schedule with General Contractor.
4. Screen is to use manufacturer's recommended frame

B. Video Projectors
1. Coordinate mounting requirements with general contractor.
2. Verify space and projector throw requirements at the job site.
3. Coordinate with electrical contractor for power requirements-
4. For small rooms up to 50 people projector must be 2000 lumen minimum, contrast Ratio of 450:1 or greater and Resolution of 1280 x 1024 (native) or greater.
5. For large rooms over 50 people projector must be 6,000 lumen minimum, contrast Ratio of 450:1 or greater and Resolution of 1280 x 1024 (native) or greater

2.4 BOOTH PLAYBACK AND INTERFACE EQUIPMENT

A. SVHS/VHS Player
1. Mount in racks

B. DVD Player
Marantz PMD-910
Marantz PMD-930 (RS-232 control for AMX/Crestron etc.)
1. Mount in racks

C. Scan Converter
1. Mount in racks in video production room.

H. NTSC (Composite Video) Distribution Amplifiers
1. Mount in racks in video production room.

2.5 MATV System

A. Audio/Video Isolator
   1. Jensen Transformers IsoMax Series

B. MATV Modulator, Combiner, Distro Amps
   1. Contractor is to calculate values needed for RF amps and taps.

C. MATV TVs
   1. Mounted on wall or ceiling location to be decided by City of Glendale.
   2. Provide mounting hardware as required.

2.6 VIDEO FURNITURE

A. Video Equipment Rack
   1. Verify space requirements and coordinate location with City of Glendale Project Manager.
   2. Verify that enclosure will provide proper cooling for rack mounted equipment.
   3. Provide one Raxxess rack power strip, MPS-Custom, for each equipment rack. Each rack power strip shall be customized for that rack's branch circuit requirements. Each equipment rack shall be: Middle Atlantic MRK series (including vented rear door), with sides, top with four (4) QFANs, and BB-40 copper bus bar.

2.7 VIDEO TIELINE EQUIPMENT

A. Video Patch Panel
   1. Mount in equipment racks and identify as shown in drawings.
   2. Unit shall be 24 jack, type 2U with jacks rated at 1.5GHz or higher.
      a. Biltree or Canare Video Patch Panel

B. Patch Cords
   1. Mount Cable Holder(s) in booth near patch bay rack.
   2. Coordinate colors with City of Glendale's Project Manager.
      a. Bittree or Canare Cables: 24" (Qty: 10) with patch cord holders as needed.

2.8 CABLE AND CONTROL WIRING

A. Electrical conductors, except where otherwise specified, shall be soft drawn annealed stranded copper having a conductivity of not less than 98% of pure copper. Acceptable Cables:
   1. Composite Video Cable: Belden 828-1 or Canare LV-61S
   2. RGBHV Cable: Canare V5-5C
   3. Projector Serial Control: Use projector manufacturer's recommended cable.

PART 3 - EXECUTION

3.1 GENERAL

A. Coordinate work with other trades to avoid causing delays in construction schedule.

B. Mount equipment and enclosures plumb and square. Permanently installed equipment to be firmly and safely held in place. Design equipment supports to support loads imposed with a safety factor of at least three. Seismic bracing shall be installed on appropriate equipment to comply with seismic requirements.

C. The process of acceptance testing the System shall necessitate moving and adjusting certain component parts including loudspeakers. Provide for j:5ø of adjustability from initial aiming angle and perform such adjustments without claim for additional payment.

D. Cover edges of cable pass-through holes In chassis, racks, boxes, etc., with rubber or nylon grommets.

E. AC Power and Grounding
   1. Coordinate final connection of power and ground wiring to racks. Hardwire, power wiring directly to internal AC receptacles, to ensure uninterrupted operation.
   2. Install 3-conductor. isolated ground, 20A, 120VAC outlets in each rack. Provide a minimum of two spare outlets in each rack. Install 30A twist-lock outlets where needed. Label each outlet as to which AC circuit is feeding it and provide the same information in the circuit breaker panel.
   3. Ground equipment chassis not having a three ire, power cord to copper bus bar in each rack. If bus bar is threaded, use screws (minimum size is 10/32) with No. 12 Wire. If bus bar is not threaded, use 6/32 nuts. bolts and locking washers with No. 12 wire. Crimp or solder wire to eyelet to connect to screw or bolt. Connect green ground wire from each AC outlet in rack to this buss bar. Connect each rack buss bar to main ground wire in local power panel with properly sized insulated cable.

F. Equipment Racks
   1. Mount equipment in racks and consoles and fully wire and test before delivery to job site. If eld conditions prevent prior assembly of racks, notify City of Glendale’s Project Manager in writing that racks will be fabricated on site and the reasons for the change. Racks located on concrete floors in equipment rooms or non-

finished spaces to mount on a 4-inch wood or concrete riser.

2. Provide ventilation adequate to keep temperature within the rack below 100ø F. Provide additional ventilation vents or fans in each rack if temperature in or around rack rises above 100degF with power on for five continuous hours.

3. Provide a fluorescent lamp fixture mounted in the top of each rack for illumination during equipment servicing.

4. Looking at the rack from the rear, locate AC power wiring on the Right; line level audio, video, and RF wiring on the Left, Panels or equipment mounted on the rear rack rails shall not block access to any front mounted components-

G. System Wiring

1. Take precautions to prevent and guard against electromagnetic and electrostatic hum. Since this system is using balanced power, connect all shields unless otherwise noted on drawing or specifications. Shields not connected to be folded back over cable jacket and covered with heat-shrink tubing. Do not cut off unused shields.
2. Exercise care in wiring; damaged cables or equipment will not be accepted. Isolate cables of different signals or different levels; and separate, organize, and route to restrict channel cross-talk or feedback oscillation in any amplifier section. Keep wiring separated into groups for microphone level circuits, line level circuits, loudspeaker circuits, and power circuits.
3. Make joints and connections with rosin-core solder or with mechanical connectors approved by the City of Glendale’s Project Manager; where spade lugs are used, crimp properly with ratchet type tool. Spade lugs mounted on 22 gauge or smaller cable to be soldered after crimping.
4. Execute wiring in strict adherence to:
   a. "standard broadcast practices," as excerpted from "Recommended Wiring Practices," Broadcast Audio Equipment for AM, FM. Television (5th Edition). Radio Corporation of America (RCA), Camden, NJ 1962
   b. Kenneth T. Deschler. Cable Television Technology. New York: McGraw-Hill, Inc., 1987

c. Phlllip Giddings. Audio System Design and Installation. Indianapolis: Howard W. Sams & Co., 1990
d. Don Davis and Carolyn Davis. Appendix II. Recommended Wiring Practices. In Sound System Engineering, 2nd Edition- Indianapolis: Howard W. Sams & Co.. 1989
e. In accordance with standard professional practice

5. Wiring entering equipment racks should connect via terminal blocks; terminal blocks shall be fully exposed, labeled, and mounted on 3/4 inch plywood board, painted flat black. If quantity of terminals is too numerous to fit in rack. Terminal blocks shall be located on wall mounted plywood terminal board adjacent to rack. Mounting boards to be 3/4 inch, marine graded or hardwood plywood painted flat black. Terminal board wiring to meet the same requirements as internal rack wiring described below.
6. Route unbroken microphone, audio, line, and control wiring from receptacle plate/chassis to patch panel/rack. Remove spliced cables and replace without additional charge to the City of Glendale.
7. Connect cable to active components through screw terminal connections and spade lugs whenever available. Make connections to speaker transformers with properly sized closed end connectors crimped with factory approved ratchet type tool. Wire nut or "Scotchlock" connectors are not acceptable. Do not wrap audio cable splices or connections with adhesive backed tape.
8. Run vertical wiring inside rack in properly sized slotted wall wiring duct with snap-on covers (Panduit Type E series). Mount raceways on full length 3/4 inch marine grade plywood backboards attached to rack sides. Horizontal wiring in rack to be neatly tied in manageable bundles with cable lengths cut to minimize excess cable slack but still allow for service and testing. Provide horizontal support bars if cable bundles sag. Neatly bundle excess AC power cable from rack mounted equipment with plastic cable ties. Rack wiring to be bundled with plastic cable ties or lacing twine. Electrical tape and adhesive backed cable tie anchors are not acceptable.
9. Connect loudspeakers electrically in phase, using the same wire color code for speaker wiring throughout the project.
10. Provide adequate service loops so that equipment mounted on rack slides shall be

pulled fully out, to their locked position, without straining cable.

11. Wiring and connections shall be completely visible and labeled in rack. Termination resistors shall be 1 percent tolerance; fully visible and not concealed within equipment or connectors.
12. Isolate cables carrying signals at different levels and separate to restrict channel bleed-through and feedback oscillation in any amplifier section.
13. Keep wiring separated into five groups of conduit provided for microphone level circuits (level below -20 dBm), line level circuits (up to +30 dBm), loudspeaker circuits (above +30 dBm), video, and power circuits
14. Isolate all wiring from conduit ground.

H. Equipment and Cable Labeling

1. Provide engraved lamicoid labels on the front and rear of active equipment mounted in racks-Mount labels in a neat, plumb and permanent manner. Embossed labels are not acceptable. Equipment labels to have at least two lines of engraving with the first line listing the schematic reference of the device, i.e., PA-4 or BoB-3. The bottom line to indicate what other devices or areas this equipment controls, i.e., FEEDS C-LT-1, 2 or FEEDS PA-7, 8.9,10.
2. Provide an engraved label over each user-operated control that describes the function or purpose of the control. Label size to be adjusted to fit available space.
3. Engraved labels to have 1/8-inch high characters minimum. Labels to be black with white characters except where indicated.
4. Cables and wiring to be logically, legibly, and permanently labeled for easy identification. Labels on cables to be adhesive strip-type covered with clear heat-shrink tubing. Hand-written labels are not acceptable.
5. Wiring designations to be an alphanumeric code that is unique for each cable. Locate the cable designation at the start and end of each cable run and within 2 inches of the point of termination or connection. For cable runs that have intermediate splice points, the cable shall have the same designation throughout with an additional suffix to indicate each segment of the run. Actual cable designation assignments to be determined by Contractor. Add cable designation codes to system schematic drawings included with Project Record Drawings.
6. Label each terminal strip with a unique identification code in addition to a numerical label for each terminal. Show terminal strip

codes on system schematic drawings included with Project Record Drawings.

7. Provide adhesive labels on the rear of equipment where cables attach to indicate the designation of the cable connected at that point.

3.2 CONTRACTOR TESTS AND ADJUSTMENTS

A. Verify the following before beginning actual tests and adjustments on the system

1. Electronic devices are properly grounded.
2. Powered devices have AC power from the proper circuit and hot, neutral, and ground conductors are connected correctly.
3. Insulation and shrink tubing are present where required.
4. Dust, debris, solder splatter, etc, is removed.
5. Cable is dressed, routed, and labeled; connections are consistent with regard topolarity.

B. Preparation for Acceptance, prior to final inspection

1. Temporary facilities and utilities shall be properly disconnected, removed and disposed of off-site.
2. All systems, equipment and devices shall be in full and proper adjustment and operation, and properly labeled and identified-
3. All materials shall be neat. clean and unmarred. with parts securely attached.
4. All broken work, including glass, raised flooring and supports, ceiling tiles and supports, walls, doors, etc. shall be replaced or properly repaired, and debris cleaned up and discarded.
5. All extra materials, portable equipment, and spares shall be delivered and stored at the premises as directed.

C. Grounding System Tests

1. Measure and record the DC resistance between the technical ground in any equipment rack or console and the main building ground. Resistance should be 0-15 ohms or less.
2. Temporarily lift the technical ground from the main electrical ground, measure and record the DC resistance between them. Resistance should be greater than 1000 ohms.

D. Audio System Tests

Perform the following tests and adjustments, supplying test equipment required. Follow EIA Standards RS-160 and RS-219 in performing tests. Make corrections necessary to bring
system(s) into compliance with the specifications.

1. Measure and record the impedance of each loudspeaker/speaker line circuit terminating at the equipment rack. Use 100 Hz for low frequency speakers. 1k Hz for mid-range speakers. 4k Hz for high frequency horns. For full range devices, use 1 k Hz.
2. Check system to assure freedom from oscillation or stray RF pickup. Check each input without signal and detect unwanted signals on oscilloscope at speaker termination in rack-
3. Check polarity of loudspeakers with an electronic polarity checker and by applying music program or constant power per octave (pink noise) signal to system while walking through the transition areas of coverage from one loudspeaker to the next. Transition should be smooth with no apparent shift in source from one speaker to the next.
4. Apply sine wave sweep signal to each loudspeaker system, sweeping from 50 Hz to 5kHz and at a level 10 dB below full amplifier output, and listen for rattles or noise. Correct if apparent.

3.3 ACCEPTANCE

A. Acceptance testing will include operation of each major system and any other components deemed necessary. Contractor will assist in this testing. Contractor shall provide at least two technicians familiar with the installation, available for the entire testing period (day and night), to assist in tests, adjustments, and final modifications. Tools and materials required to make any necessary repairs, corrections, or adjustments shall be furnished by the Contractor.

B. Provide four portable UHF business band radios for use during acceptance testing. Radios should have a transmission range sufficient to cover entire project. Radios to include rechargeable batteries and charger along with "holster" for wearing on belt. Radios to be available for duration of testing process, including any follow-up visits required prior to final acceptance. Confirm that radio frequencies used are not in use elsewhere on project site.

C. The following procedures, will be performed by the Consultant on each System:
   1. The audio fidelity test shall consist of driving the system with pink noise and measuring the response from 50 Hz to 16k Hz, Parametric filters will be used to adjust the response of the system (s) to fit the requirements of the space.
   2. Control functions shall be checked for proper operation, from controlling devices to controlled devices.
   3. Adjust, balance, and align equipment for optimum quality and to meet the manufacturer's published specifications. Establish and mark normal settings for

each level control, and record these settings, in the "System Operation and Maintenance Manual".

4. Installed, spare, and loose equipment will be inventoried for correct quantity.
5. Any other test on any piece of equipment or system deemed appropriate.

D. In the event the need for further adjustment or work becomes evident during equalization or acceptance testing, the Contractor will continue his work until the system is acceptable at no addition to the contract price. If final acceptance is delayed because of defective equipment, or failure of equipment, or if installation fails to meet the requirements of these specifications, the Contractor will pay for additional time and expenses of the City of Glendale during any extension of the acceptance testing period.

3.4 INSTRUCTION OF CITY PERSONNEL

A. Provide one technician on site for 1 day (eight hours) for Instruction to City of Glendale Project Manager on the use and operation of the System, scheduled by an instructor fully knowledgeable and qualified in system operation. Allow City of Glendale to videotape all training sessions. The System Reference Manuals should be complete and on site at the time of this instruction.

B. The lead technician for the project installation should be present at the first formal use of the system.

END OF SECTION

27 42 00 Electronic Digital Systems

27 50 00 Distributed Communications and Monitoring Systems

27 52 23 Intercommunication and Program Systems

01 Intercom System Specifications

AUDIO / VISUAL INTERCOM SYSTEM

PART 1 -GENERAL

1.1 SCOPE OF WORK

A. Work includes all labor, materials, tools, transportation services, supervision, coordination, etc., necessary to complete the installation of the intercom system, as described in these specifications and illustrated on the associated drawings. The system includes the following major items:

1. Complete intercom systems including user stations, beltpacks, IFB packs, headsets, power supplies, wiring, etc.

B. The contract also includes:

1. Verification of dimensions and conditions at the job site.
2. Preparation of submittal information.
3. Installation in accordance with the contract documents, manufacturer's recommendations, and all applicable code requirements.
4. Initial tests and adjustments, written report, and documentation.
5. Instruction of operating personnel; preparation of user manuals.
6. Maintenance services; warranty.

C. This contract will be administered by the City of Glendale or their representative.

1.2 RESPONSIBILITY AND RELATED WORK

C. Coordinate work with the City of Glendale Project Manager, General Contractor, Electrical Contractor and the scheduled work of other trades.

D. The Intercom System contractor is responsible the provision and installation of all equipment and wiring listed herein. The Intercom System contractor will also provide commissioning including systems testing, checkout, and programming at the completion of the project.

C. The electrical contractor is responsible for the provision and installation of all AC power to the needed locations per system design. Installation and termination of power & intercom circuits including conduit, junction boxes, and electrical wire-ways for Intercom System.

D. Refer to all electrical drawings and specifications in addition to the Intercom systems drawings for related conduit, cabling, power, and distribution details. Supply accessories and minor equipment items needed for a complete system, even if not specifically mentioned herein or on the drawings, without claim for additional payment.

E. Notwithstanding any detailed information in the Contract Documents, it is the responsibility of the Intercom System contractor to supply systems in full working order.
Notify the City of Glendale Project Manager/Representative of any discrepancies in part numbers or quantities before bid. Supply items and quantities according to the Intent of the Specification and Drawings without claim for additional payment.

F. Obtain all permits necessary for the execution of any work pertaining to the installation, or any operation by the owner and contractor.

G. Execute all work in accordance with the National Electric code, the National Electrical Safety Code and all applicable local and State codes, ordinances, and regulations. If a conflict develops between the contract documents and the appropriate codes and is reported to the City of Glendale Project Manager / Consultant prior to bid opening, the City of Glendale's Project Manager / Consultant will prepare the necessary clarification. Where a conflict is reported after contract award, propose a resolution of the conflict and, upon approval in writing from City of Glendale Project Manager / Consultant, perform work.

1.3 REFERENCES

A. National Fire Protection Association (N.F.P.A.)

B. National Electrical Code (N.E.C.) and California Electric Code (C.E.C.)

C. American National Safety Institute (A.N-S.I.)

D. Electronics Industries Association (E.I.A)

E. Sound System Engineering (2nd Edition), Davis and Davis, Howard W. Sams. 1987

F. Audio System - Design and Installation. Giddings. Howard W, Sams, 1990

G. Cable Television Technology. Kenneth T. Deschler, New York: McGraw-Hili. Inc., 1987

H. Handbook of Intercom Systems Engineering (Telex)

1.4 SYSTEM DESCRIPTION

A. Intercom System

1. The Intercom system will provide controlled communication between locations as needed.

1.5 SUBMITTALS

A. Submit all shop drawings and submittals in accordance with project standards. Quantities listed herein are the minimum required of this contractor.

B. Shop drawings and submittal data shall contain sufficient information to describe the work to be performed. Drawings shall be executed at an appropriate scale, not smaller than 1/8" = 1 '-O". Submit five (5) black and white sets and 1 CD-ROM set of drawings; submit 2 copies of catalog data sheets (8-1/2" x 11") neatly bound in sets. Submit all Shop Drawing information at one time. Information shall include but not necessarily be limited to;
1. System control riser diagram.
2. System distribution riser diagram.
3. Control wiring charts.
4. Electrical details.
5. Control systems physical and electrical details.
6. Distribution raceway physical details.
7. Other details or schematics required for systems operation.

C. Contract Closeout Submittals

1. Keep a complete set of drawings on the job, note any changes made during installation, and submit 1 corrected set of reproducible mylar drawings showing Work as installed. Also include this information in one CD-ROM set submitted to the City of Glendale Project Manager.
2. Submit the following data for review, prepared as Indicated, at least one week prior to acceptance testing (exceptions noted):
a. System Reference Manual: Furnish 2 copies, in 3-ring binders, sized to hold the material plus 50 percent excess, with clear vinyl pockets on cover and spine for project title. Provide tabular dividers with permanent legends for the following sections:
(1) System Operation and Instructions: Prepare a complete and typical procedure for the operation of the equipment as a system, organized by subsystem or activity. This

procedure shall describe the operation of all system capabilities. Assume the intended reader of the manual to be technically inexperienced and unfamiliar with this facility.

(2) A list of all equipment, indicating manufacturer, model, serial number, and equipment rack location. Update following acceptance testing, if changed.

(3) A list of settings of all semi-fixed controls. Update following acceptance testing.

(4) Photographically reproduced schematic wiring diagrams of each major sub-system, based on the as-built documentation, at a reduced scale easy to handle but fully legible. Blue-line (or similar diazo process) prints are not acceptable.

(5) Maintenance Instructions, including Installer's maintenance phone number(s) and hours; maintenance schedule; description of products recommended or provided for maintenance purposes, and Instructions for the proper use of these products.

(6) Manufacturer's Instruction Manuals for all items of equipment, incorporating or followed by manufacturer's warranty statements. For custom circuits or modifications, a description of the purpose. capabilities, and operation of each Item,

(7) Any other pertinent data generated during the project or required for future service.

b. Photographically reproduced as-built headend wiring diagrams and overall building wiring diagrams, at a reduced scale easy to handle but fully legible. Blue-line (or similar diazo process) prints are not acceptable. Mount wiring diagrams behind Plexiglas in the equipment racks.

1.6 SUBSTITUTIONS

A. Request for substitutions shall be submitted in writing. Requests shall be submitted to the City of Glendale’s Project Manager / Consultant no later than 1 week before the bid opening. Confirmation of the acceptance of substitutions shall be issued to all bidders of record as addenda to the Drawings and Specifications and will become part of the Contract Documents. The City of Glendale’s Project Manager / Consultant will not be responsible for oral clarification.

B. Substitutions after Bid award will only be considered when a Product becomes obsolete or commercially unavailable through no fault of the Contractor.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

1.7 QUALITY ASSURANCE

A. Qualifications and Experience

B. The following criteria will be used as a standard for judging installation qualification and project experience:

1. Installing Contractor to have previously installed jobs of similar magnitude, completed within the last five years. Similar magnitude includes: equal or larger venue size. system cost and complexity. Provide evidence of at least one such completed job for inspection by the City of Glendale's Project Manager / Consultant. Information to include project scope, system description, system cost, and references.
2. Installing Contractor to have at least five years experience with equipment and systems of the types specified.
3. The installing Contractor shall maintain a fully staffed and equipped service facility, and shall be a franchised dealer for the major brands specified-
4. The Installing Contractor shall be properly licensed to work in Glendale, Arizona.
5. The Installing Contractor shall have staffing and computer systems to produce acceptable quality shop drawings and project record documents. Schematic diagrams, speaker location, orientation, rigging, fabrication and layout details to be produced using AutoCAD R14 or later.

C. Contractor Qualification Submittals Submittals for qualification must include all of the following:

1. A description of the installing contractor's fulfillment of qualifications and experience in all areas listed in the section above.
2. A brief company description outlining company history including how long the company has been in business, the number of personnel employed, etc.
3. Resumes of staff that will be involved in working on the project and their roles. Include education, training, experience, professional societies, and notable contributions to the industry.
4. Representative project list. Include a project description, company personnel who worked on the project with their involvement, and a reference point of contact. Note whether the key personnel involved in these projects are still employed with the company.
5. Samples of project documentation. Include schematic diagrams, details, panel fabrication details, and any other applicable documentation.

1.8 PROJECT CONDITIONS

A. Verify all conditions on the job site applicable to this work. Notify the City of Glendale's Project Manager / Consultant in writing of discrepancies, conflicts, or omissions promptly upon discovery.

B. The drawings diagrammatically show cables, conduit, wiring, and arrangements of equipment fitting the space available without interference. If conditions exist at the job site which make it Impossible to install work as shown, recommend solutions and/or submit drawings to the City of Glendale's Project Manager / Consultant for approval, showing how the work shall be installed.

1.9 ACCEPTANCE TESTING

A. Upon completion of installation and initial tests and adjustments specified in part 3, acceptance testing shall be performed by the City of Glendale.

B. Provide personnel familiar with all aspects of the system to assist during acceptance testing in accordance with part 3 of this specification.

C. The process of acceptance testing the system shall necessitate moving and adjusting certain component parts; perform such adjustments without claim for additional payment.

1.10 WARRANTY

A. Installer shall warrant equipment to be free of defects in materials and workmanship for not less than one year after date of Final Acceptance. Defects occurring in labor or materials within one-year warranty shall be rectified by replacement or repair. Within the warranty period, provide answer to service calls and requests for information within a 24-hour period, and repair or replace any faulty item within a 72-hour period without charge, including parts and labor.

B. This warranty shall not void specific warranties issued by manufacturers for greater periods of time. Nor shall it void any rights guarantied to the City of Glendale by law.

C. Contractor to provide the City of Glendale's Project Manager with exact beginning and ending dates of the warranty period. Include the name of the person to call for service and telephone number. This information to be part of Project Record Drawings.

PART 2- PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Model numbers and manufacturers included in this specification are listed as a standard of quality. Specific model will be dependant on the needs of the facility and approval of the City of Glendale's Building Standards Committee. Equivalent substitutions shall be approved by the City of Glendale's Projector / Consultant in writing. Any proposed substitutions shall meet all specifications of the specified equipment. Proposed equivalent substitutions approved in writing by the City of Glendale's Projector Manager / Consultant will be considered acceptable substitutions.

B. Other qualified manufacturers will be considered subject to approval by City of Glendale's Building Standards Committee.

2.2 GENERAL

A. All equipment and materials shall be new, and shall conform with applicable UL. CSA, or ANSI provisions. Take care during installation to prevent scratches, dents, chips, etc. Damaged equipment shall be replaced with new equipment at no cost to the owner.

B. Regardless of the length or completeness of the descriptive paragraph herein, each devic shall meet all of its published manufacturer's specifications. Verify performance as require Where two or more acceptable products are listed, the Installer shall use either at his option.

C. Install all rack mounted equipment with black 10-32 button head machine screws with Phillips drive unless otherwise specified.

D. Provide security covers on all non-user-operated equipment having front panel controls. Install covers at the conclusion of Acceptance Testing as described in Part 3.

E. Custom rack panels shall be 1/8-inch thick aluminum, standard EIA sizes, brushed black anodized finish unless otherwise noted (Brush in direction of aluminum grain only). Custom connector plates are typically stainless steel; however, it is the Installer's responsibility to verify plate finish with the City of Glendale's Project Manager / Consultant. Plastic plates will not be accepted.

F. All engraving shall be 1/8-inch block sans serif characters unless noted otherwise. On dark panels or pushbuttons, letters shall be white; on stainless steel or brushed natural aluminum plates, or light-colored pushbuttons, letters shall be black,

2.3 INTERCOM SYSTEM

A. Intercom Base Stations

1. Provide Intercom Base Stations as required
   a. RTS
   b. Power supply capable of at least 200% of system design (for future expansion)

B. Wireless Intercom Base Stations/Beltpacks

1. Provide Wireless Intercom Base Stations as required
   a. RTS 800 Series (Frequencies not to interfere with other wireless systems in the project or area)
   b. RTS TR-825

C. Wired Belt Packs

2. Include two spare (total) for the project.
   b. RTS BP-325

D. IFB

1. Include one spare module (total) for the project.
   b. RTS
   c. RTS 4030 stations w/earset

E. Headsets

1. Provide two spare (total) for the project.
   a. Beyerdynamic DT 108 and/or DT 109 w/5pin connector. (a combination o both recommended.)

2.4 CABLE

D. Intercom cables must be in conduit unless otherwise noted.

E. Use intercom system manufacturer's recommended cable

1. Intercom cable: Belden 8761, 8723, 9406

F. Electrical conductors installed under this contract, except where otherwise specified, shall

be soft drawn annealed stranded copper having a conductivity of not less than 98% of pure copper.

2.9 CONNECTORS

A. Acceptable Cable-End connectors:

5. Switchcraft

PART 3 – EXECUTION

3.3 GENERAL

E. Coordinate work with other trades to avoid causing delays in construction schedule.

F. Mount equipment and enclosures plumb and square. Permanently installed equipment to be firmly and safely held in place. Design equipment supports to support loads imposed with a safety factor of at least three. Seismic bracing shall be installed on appropriate equipment to comply with seismic requirements.

G. The process of acceptance testing the System shall necessitate moving and adjusting certain component parts. Provide for adjustability perform such adjustments without claim for additional payment.

H. Cover edges of cable pass-through holes in chassis, racks, boxes, etc., with rubber or nylon grommets.

3.4 INSTALLATION

A. Confirm by site visit and by report from electrical contractor, all field conditions, which may affect manufacture and installation of intercom system equipment prior to fabrication. Provide any additional hardware, panels and back boxes necessary to accommodate field conditions. Submit all changes of equipment and mounting details to City of Glendale Project Manager / Consultant for review prior to fabrication.

B. Mount power supplies in rack with one unused space above and below it for adequate cooling. Install vented rack blanks in those spaces.

C. Supply specific, detailed direction to electrical contractor as required for proper installation of all Intercom System equipment, coordinated with actual site conditions.

D. The Intercom System contractor shall furnish all items required to properly install and secure Intercom System equipment in place.

E. If any panel, distribution box, or other device requires relocation or change of mounting detail and this fact is not known until after shipment due to sequence of work, modify equipment or provide new equipment to fit revised location or mounting detail- Notify the City of Glendale Project Manager / Consultant of any such changes, and submit all changes to City of Glendale Project Manager / Consultant for review prior to fabrication.

F. Terminate all control wiring and all control panels.

G. Supply General Contractor with all paint and supplies to correct minor cosmetic damage to equipment. Ensure that all equipment is clean and in perfect condition at time of Completion Checkout.

H. Repair or replace any equipment, which has suffered non-cosmetic damage prior to time of Completion Checkout. Claims arising from repair or replacement of such damage shall be considered only after final acceptance of system by the City of Glendale.

I. The contractor shall clean all racks, panels, and boxes of dirt, dust and debris, reassemble all equipment, and replace all panels, covers and screws prior to time of Completion Checkout.

J. Do not use any control equipment intended for installation for purpose of checking out wiring or circuitry prior to proper conditions existing on site (as specified above). Equipment may be used for such testing only in specific areas where proper conditions exist.

K. Cable Integrity

1. All wire and cable should be continuous and splice-free for the entire length of run between designated connections or terminations. Under no conditions should cable be spliced.

L. Cable Support

1. Secure all wire and cable run vertically in conduit for distances of greater than thirty feet at the vertical run terminations or outside conduit at distances of no more than ten feet. Under no conditions shall a connection point support any cable in the system. All cables should be secured prior to any connections. Do not use adhesive plates for securing cable ties, and under no conditions should cable ties be secured to removable equipment.

M. Cable Identification

1. Identify all wire and cable clearly with permanent labels printed and replicated about the full circumference of the cable, so that cable identification can be read without the need to turn or rotate the cable.

N. Label Location

1. Provide identification within one inch of each connection and, where wire and cable enter or exit from conduit or boxes, within twelve inches of the point of entry or exit.

O. Label Material

1. Label materials should be durable, with non-erasable identification clearly visible below any protective covering. Lettering shall be of sufficient density to afford reading in reduced rack lighting. Minimum character size shall be 1/8”,

utilizing either 24-pin dot matrix printers in high-density mode, or laser printers. Labels should be self-laminating type, printed with cable identity codes only, repeated continuously and completely about the circumference of the cable, and should be of sufficient size to show printable area completely around the cable. Avoid using descriptive labels. They are often vague and confusing. Brady, Panduit or Thomas and Betts manufacture acceptable labels.

P. Routing

1. All internal cabling should remain within the respective rack frame. Inter-rack wiring within the same contiguous group of racks should be routed via the rack bases; inter-rack wiring between rack groups and to other areas of the project should be routed via the overhead cable tray, conduit, or computer floor. Never run any cable laterally between adjacent racks through side openings within the rack bay.

Q. Service Loops

1. Provide service loops where harnesses or different classes cross, where equipment is mounted on rack slides, where equipment not on rack slides must be removed from the front, or where hinged panels are to be interconnected. Service loops should permit full extension of rack slides, or removal plus one foot of front access equipment not on rack slides, without visible stress on service loop.

R. Fanouts

1. Provide proper fanout of cables, using adequate cable ties, for successive connections from one side of the connected equipment. Fanout should be accomplished in a logical manner with a minimum of cable crossover and stress on cables. Fanout points should permit easy access to cable identification labels.

S. Cable Shielding

1. All shielded cable should be insulated. Do not permit shields to contact conduit, raceway, boxes, panels or equipment enclosures. Tin terminated shield drain wires and insulate with heat shrinkable tubing.

3.3 CONTRACTOR TESTS AND ADJUSTMENTS

A. Prior to energizing Intercom systems perform complete system checkout to verify that all items are correctly installed and shall safely operate as specified herein.

B. Perform all tests and adjustments specified below upon Completion of installation of Intercom System.

C. Intercom System contractor shall provide all appropriate adapters, extension cables and connectors necessary to connect test equipment to Intercom system, and to perform all tests described below.

D. Intercom System Contractor shall provide sufficient field service personnel (minimum of 1) to perform all tests specified below. The Intercom System contractor shall furnish sufficient workmen to operate all equipment and to assist in all tests specified below. Intercom System contractor shall provide ladders and other devices, including 2 walkie-talkies, to allow access to all devices to be tested and communication between parties.

E. Test Procedures

1. Perform the following tests:

a. Inspect all device labels to ensure that devices are correctly and clearly labeled as specified and shown in drawings.
b. Test all circuits for proper wiring, polarity, voltage, connection to proper operation, and inspect for correct labeling.
c. Test all power receptacles provided in this section.
d. Test all equipment for all functions. Test other panel functions a minimum of 2 times consecutively from each panel.
e. Test all control plug-in points at least 2 times.
f. Test all extension cables, adapters, etc. Test and adjust all spare parts.
g. Test and balance system levels from station to station.

F. Repair or replace any equipment, which fails to conform to specification, and schedule second set of tests and adjustments. Provide test equipment and personnel specified above.

G. Repeat testing and repair or replacement as necessary to make entire Intercom System conform with specification.

1. Upon completion of testing, furnish City of Glendale Project Manager / Consultant and Architect a complete report on all field testing and adjustment, certifying that system conforms to specification and that installation is complete and ready for inspection.

3.4 ACCEPTANCE

A. Acceptance testing will include operation of each major system and any other components deemed necessary. Contractor will assist in this testing. Contractor shall provide at least two technicians familiar with the installation, available for the entire testing period to assist in tests, adjustments, and final modifications. Tools and materials required to make any necessary repairs, corrections, or adjustments shall be furnished by the Contractor. Testing process is estimated to take a minimum of 1 day.

B. Provide two portable UHF business band radios for use during acceptance testing. Radios should have a transmission range sufficient to cover entire project. Radios to include rechargeable batteries and charger along with "holster" for wearing on belt. Radios to be available for duration of testing process, including any follow-up visits required prior to final acceptance. Confirm that radio frequencies used are not in use elsewhere on project site.

C. In the event the need for further adjustment or work becomes evident during equalization or acceptance testing, the Contractor will continue his work until the system is acceptable at no addition to the contract price. If final acceptance is

delayed because of defective equipment, or failure of equipment, or if installation fails to meet the requirements of these specifications, the Contractor will pay for all additional cost that the City of Glendale may incur to correct the problem.

3.5 INSTRUCTION OF CITY PERSONNEL

C. Provide one technician on site for 1 day (eight hours) for instruction to City of Glendale designated personnel on the use and operation of the System, scheduled by an instructor fully knowledgeable and qualified in system operation- Allow City of Glendale to videotape all training sessions. The System Reference Manuals should be complete and on site at the time of this instruction.

D. The lead technician for the project Installation should be present at the first formal use of the system.

END OF SECTION

27 60 00 Reserved - Not used

27 70 00 Reserved - Not used

27 80 00 Reserved - Not used

27 90 00 Reserved - Not used

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

28 10 00 Electronic Access Control and Intrusion Detection

28 13 00 Access Control

01 Specification for Access Control System

ACCESS CONTROL SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Server Hardware / Software
B. Application Software
C. Intrusion detection devices
D. Security access devices
E. Access Control, Relay Control, and Alarm Monitoring controllers

1.2 RELATED SECTIONS

A. Section 17000 – General Provisions
B. Division 0
C. Division 1

1.3 REFERENCES

A. Materials and workmanship shall conform to the latest issue of all industry standards, publications, or regulations referenced in this section and with the following references as applicable. Refer to Section 16xxx for listing of issuing organizations or agencies.

1. NFPA 70 – National Electrical Code
2. UL294 – Standard for Access Control Systems
3. NFPA 72 – National Fire Alarm Code
4. NFPA 101 - Life Safety Code.

1.4 REGULATORY REQUIREMENTS

A. System shall be UL-Listed.

1.5 NEW SYSTEM DESCRIPTION

A. The Hirsch Electronics “VELOCITY Version 2” Security Information Management System shall be a modular and network capable access control system. The access control system shall have the ability of controlling multiple remote sites, controlled access with various reader technologies supported simultaneously, alarm monitoring, Photo Call-Up, Photo ID Badging, and CCTV switcher control; the system allows for expansion or modification of readers, inputs, and outputs. The system control at the central computer location shall be under a single software program control, shall provide full integration of all components, and shall be alterable at any time, depending upon the facility requirements. Reconfiguration shall be accomplished on-line through system programming, without hardware changes.

B. The system shall support both manual and automatic responses to alarms entering the system. Each alarm shall be capable of initiating a number of different actions, such as camera switching, activation of remote devices and door control.

C. Access control functions shall include, validation based on time of day, day of week, holiday scheduling, automatic or manual retrieval of cardholder photographs, and access validation based on positive verification of card, card/PIN, and PIN.

D. The VELOCITY System shall be capable of interface to a CCTV matrix control system through a serial software interface, simulating alarm inputs.

E. Utilizing assigned passwords, it shall be possible to define the levels of system operation for each individual Operator. Operator Actions range from basic monitoring to full control of the system databases.

F. The system programming shall be user-friendly Windows environment (use conventional “Title Bar”, “Menu Bar”, “Tool Bar” and “Status Bar”) and allow mouse control of key functions. The programming shall be MENU driven and include on-line “Documentation”, “Help” or “Tutorial” information, as well as on-line data entry examples. The software shall utilize combo boxes for all previously entered system-required data. The system shall provide supervised alarm point monitoring. Upon recognition of an alarm, the system shall be capable of displaying alarm information in text format, on a graphic floorplan, and switching CCTV cameras that are associated with the alarm point. The system shall be capable of arming or disarming alarm points both manually and automatically, by time of day, and day of week.

G. The method of communication from remote locations to the central components shall be transparent to the user.

H. After installation, the OWNER shall be able to perform hardware configuration changes as desired without the services of the MANUFACTURER.

I. Equipment repair shall be able to be accomplished on site, by module replacement, utilizing spare components.

J. All control components shall utilize "Distributed-Processing" concepts. The distributed processing shall include the ability to down-load operating parameters to any field panel, thus allowing the field panel to provide full operating functions independent of any other system component.

K. System shall be capable of utilizing the LAN / WAN to connect this building to others; install Hirsch LIF-U LAN Serial Servers and optionally as required, Hirsch X-Box communications devices to communicate to the controllers.

L. The Controllers shall utilize Version 7 or later Flash downloadable CCM (Command and Control Modules) firmware.

M. Provide a complete photo ID Badging system, including: Integral

Peripherals Flash Bus Video Capture Card (Hirsch Model VCC-WOVGA); S-Video Camera with gooseneck (Hirsch Model IDCAM; Ultra Magic Card RIO Printer (Hirsch IDP-MLR); Printer Rolls (Hirsch Model ID-MLC-1D).

1.6 WARRANTY AND SERVICE AGREEMENT

A. All equipment, materials, and labor shall be guaranteed for a period of 24 months from the date of final acceptance by the Owner.

B. Provide any software maintenance updates or upgrades at no additional cost to the Owner for this period.

C. Perform two (2) scheduled preventative maintenance site visits per year during the warranty period.

D. Response Times – Normal business hours shall be 7 AM to 5 PM Monday through Friday. Calls for service before noon shall be responded to on-site before the end of the day. Calls after noon shall be responded to on-site by noon the following business day.

E. Provide extra costs for time outside of normal business hours if the Owner requires emergency service.

F. Submit an all inclusive Annual Maintenance Agreement cost for years 3 and 4.

G. Submit normal and after hours labor costs and typical costs for equipment for items not covered under the Warranty, like: Acts of God, vandalism, misuse.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Hirsch Electronics Corporation, Security Information Management System “VELOCITY for Windows 2000”, model **VEL** (Velocity Server plus unlimited remote clients).

2.2 BASIC CENTRAL SYSTEM COMPONENTS

A. Central Processing Unit Computer Specifications: The software shall operate on an IBM or IBM-compatible desktop (full-size) personal computer. The requirements for the computer, rated to the size of the system, are as follows:

B. Central Processing Unit (CPU): The computer CPU shall be type Pentium III or greater.

C. Random Access Memory (RAM): The computer shall have a minimum of 256 MB RAM for the Server or Single User Workstation, and 128 MB RAM for Clients.

D. Disk Drives: The computer shall have a 20 GB IDE or SCSI hard disk drive minimum, a 3.5" floppy disk drive, and CD-ROM (CD-R preferred).

E. Monitor: The computer shall have a 17” SVGA color.

F. Mouse: 2 button bus type

G. Keyboard: The computer shall have a standard 101-keyboard layout and IBM-compatible.

H. Modem: The modem shall be a 56K internal modem with PCAnywhere 9.2 Remote Control Software for the server computer. The owner will provide a dedicated voice-grade phone line at the Head-End Server location.

I. Operating System: The VELOCITY Server computer shall operate under Windows 2000 Server with Service Pack 2 and the Single User Server or Client shall operate under Windows 2000 Professional with Service Pack 2.

J. Database: The VELOCITY Server shall have MSDE SQL Server Database Version 7 included and loaded with the application.

K. Parallel Printers

1. Report Printer - The computer shall have one parallel printer port, and corresponding printer HPLJ6 (or approved equal) and printer drivers for Windows 2000.

2. Badging Printer - The computer shall have one parallel printer port, and corresponding printer Hirsch ID Printer and printer drivers for Windows 2000.

3. Alarm and Event Printer - The computer shall have one parallel printer port, and corresponding printer Hirsch PR-1 and printer drivers for Windows 2000.

L. Tape Drive – Internal on Server

1. The tape drive shall be a 20/40 GB DAT. Provide 12 Blank Tapes.

M. Communications Interface To Field Controllers Supported

1. RS-232
2. RS-485
3. TCP/IP

N. Control Panel Specifications: The control panel shall incorporate microprocessor-based, digital technology, using high speed processing for maximum reliability.

O. Distributed Intelligence

1. The system shall use distributed intelligence architecture, with controllers operating independently of one another.

2. Globalized functions for all controllers connected to an X-Box

communications loop shall include: Use Count, Absentee Limit, Temporary Days, Passback, and Global I/O and shall not require the host to be online for processing and control.

P. Stand Alone Operation

1. All database information required for stand alone operation shall be stored at the control panel level. All decision-making shall be performed at the control panel, eliminating the need for degraded mode operation.

2. Proprietary software programs and control logic information used to coordinate and drive system hardware shall be stored in Flash Downloadable Read Only Memory.

2.3 SYSTEM CONFIGURATION

A. The head-end shall support 1 Server Computer that may optionally be used as a full functioning Client. The system shall support unlimited remote Client computers will full system functionality.

B. Host Computer to Controller Communication Protocols

1. Communications between the computer and the controller shall be accomplished by Scramble*Net Communications and shall be encrypted using a 64-bit cipher feedback method (HES -Hirsch Encryption Standard). The encryption shall be full time and not require any programming or key setting to operate.

2. The system shall utilize RS232 up to 50' for hardwired applications.

3. The system shall utilize RS485 up to 4000' (4-wire hardwired). Longer distances are allowed with a communications multiplexer / amplifier (Hirsch Model NET*MUX4), if applicable.

4. The system shall utilize TCP/IP for communicating over computer networks.

5. All of the communications protocols shall be supported simultaneously on the system.

C. Host Computer to Controller Communication Transmission Methods/Hardware

D. Communications between the computer and the controller shall be able to use any or all of the following methods:

1. Hardwired
2. Leased line modem
3. Fiber Optic
4. Microwave
5. RF
6. Ethernet

E. Proprietary Network Interface Hardware: The controller shall be

interfaced to an industry standard personal computer running proprietary software with the addition of an opto-isolated network communications interface board (Hirsch Model: SNIB). The Scramble Net Interface Board will accept RS232 or RS485 communications interface. Each board is uniquely addressable through on-board dipswitch settings and has an adjustable baud rate from 1200 – 19,200. The board shall be mounted in the controller cabinet and connect to the controller board via an expansion bus cable.

F. Maximum System Wide Capacities

1. The following shall be the maximum system wide capacities. The actual number shall be dependent upon the mix of controllers that make up the system.

a. Doors: Unlimited
b. Supervised Alarm Inputs: Unlimited
c. Control Relays: Unlimited
d. Controllers: Unlimited

2.4 SYSTEM SOFTWARE

A. General layout of the software “Windows” will include but not be limited to:

1. **Main Menu Bar** shall be used to access all Velocity Functions from a standard pull down menu method.

2. **Tool Bar ICONS** shall be used to access all common Velocity Functions with a single mouse click.

3. **Customizable Graphical User Interface** shall allow for configuring the screens in a variety of layouts. Layouts for each window include: Docked to the Top, Bottom, Left, and Right; Floating; Child – Minimized, Maximized, Restored. Each Operator shall have their own unique layout for available options. If dual-monitors are used, the Customizable GUI shall apply to both monitors.

4. **Tool Tips** describing the feature(s) that the selected item represent, will be displayed in small “bubbles” underneath the selected item, field caption or other component. These tool tips shall be user definable.

5. **The Administration Console** shall use the familiar Explorer metaphor with a tree of folders in the left pane and details of selected folders in the right pane. The left pane shall include the following main components: Main Administration Console, Velocity Configuration, DIGI*TRAC Configuration, and Interface Configuration.

a. The Main Administration Console shall include:

1) Alarm Viewer
2) Badge Designer

3) Browser
4) Customization Manager
5) Enrollment Manager
6) Event Viewer
7) Graphics
8) Report Manager
9) Status Viewer
10) SQL Manager
11) Task Scheduler

b. The Velocity Configuration Module shall include:

1) Credential Templates
2) Time Zones
3) Holidays
4) Door Groups
5) Function Groups
6) Operators
7) Operator Groups
8) Command Sets
9) Workstations

c. The DIGI*TRAC Configuration Module shall contain:

1) Add either an S*NET or X*NET communications port, either serial or TCP/IP
2) Add DIGI*TRAC Controller
3) Doors, Readers, Inputs, Outputs, Expansion Inputs, Expansion Outputs

6. The Interface Configuration Module shall define the parameters for communicating to a CCTV switcher.

7. **Dialog Boxes** will provide a means for entering information into fields and displaying information from the System Software database.

B. Workstation Customization

1. The Operator may customize the general functionality of several features of the System Software per individual Operator. The features that may be customized will include but not be limited to: Alarm Viewer, Event Viewer, customizable Graphical User Interface.

2. Alarm Viewer will bring the “Alarm Viewer Window” forward on new alarm(s) while you are in other Velocity windows.

C. Time Zones: Time Zones define periods during which readers, cards, codes, alarm inputs, doors or other system features are active or inactive. Basic configuration parameters shall “ask” the Operator to define “when” the user is enabling (or disabling) a specific feature. In

addition to Monday-Sunday, there shall be one day of the week called Holiday. When selected, there will be 4 Holiday Schedules that determine if the Holiday is to be followed for this Time Zone. There shall be 64 Standard Time Zones, 64 Master Time Zones, and 20 Grand Master Time Zones.

D. Holidays: Holidays are used within the system for the purpose of defining if a Time Zone is to be followed on a defined Holiday. Each Time Zone has up to 4 Holiday schedules. There are 366 user definable Holidays this year and 366 days next year. It shall be possible for the Operator to "Make the rest of Today a Holiday".

E. Door Groups

1. Door Groups shall allow the user to establish groups of readers, each with its own unique Time Zone, at a facility for the purpose of granting or denying access to Credentials. Door Groups are assigned to Credential Templates, and people being added to the system take on the Door Group of the Credential Template selected during the enrollment process. A new Door Group may be defined when adding a Credential or Credential Template without having to exit and re-enter the Credential function for that Person.

2. The Door Group application shall allow the user to view any existing Door Group listed in the dialog box. A user, with proper authority, shall be able to modify, add, or delete a Door Group from the System Software.

F. Function Groups: Credentials can be assigned to perform a single User Function, like Momentary Access. When multiple User Functions are required by a Person, a Function Group may be defined and associated with one or more credentials. The Function Group requires a ScramblePad keypad to be used, where the Person's base Credential PIN number is entered, followed by an * (Asterick), followed by a one or two digit Extension digit, which defines which User Function will be issued for which Control Zone. This allows for a single person to perform multiple User Functions like: Unlock Door, Relock Door, Change Threat Level, Mask Alarm Inputs, Lock Down Doors.

G. Credential Templates: A Credential Template shall be used when adding Credentials to people. The Credential will take on the properties of the Credential Template selected. This will minimize the number of keystrokes and time required to add a Credential to a person. The Credential Template properties include: Credential Name; Badge Template; Activation and Expiration Date and Time; ID Format; Card Type; Code Length; Duress Digit; Credential Function and Category; Door Group or Function Group; Threat Authority; 2 Person Rule options; Use Count, Day Limit, and Absentee Limits; Apply Credential Management Globally; Tag, Alert, Disable Credential; Issue Number; Status; Executive Override for Passback; Special Needs Access Extension.

H. Command Sets: A Command Set defines an action or actions to be sent to a controller or controllers. Command Sets can include: Unlock and Relock a Door; LockDown and Release a LockDown on one or more

doors; make the rest of today a Holiday; Mask all Interior Alarm Points; change the facility Threat Level; Forgive All Passback. Once defined, a Command Set can be executed from the Command Set Window, or from a Graphic Floorplan ICON, if defined. There shall be an unlimited number of Command Sets available to be defined. Command sets shall be defined with pick lists and shall be restrictable by Operator Group and Workstation.

I. Operator Groups: Each Operator entered into the System Software system shall be assigned to an “Operator Group”. This feature shall allow the Operator to take on the Rights to Components, Reports, Graphic Floorplans, and Command Sets. The Rights for Components can grant or deny the ability to Add, Delete, Save, or Open a component, as well as restrict to the Properties or Dialog boxes to the Tabbed level.

J. Operator: Operators entered into the system shall take on the Rights of the Operator Group to which they are assigned. In addition, a unique set of Permissions can be defined per Operator which grant or deny the Operator’s ability to perform system functions, like: Acknowledge and Clear 1 or more alarms; Assign/Unassign Credentials; Change Alarm and Event Viewer Properties; Display Scramble*Pad Codes; Download Credentials; Preview and Print Badges; Use any or all of the Component Windows.

K. Task Scheduler: There shall be a Task Scheduler that allows functions to be performed on an as needed basis, like activating and deactivating credentials. It can also schedule Tasks like Synchrozine Controller Clocks and Run Historical Log Archiver on a Daily, Weekly, Monthly basis.

L. SQL Database Manager: The SQL Database Manager shall be used to Backup and Restore data from the SQL database. Manual or automatic backups may be defined. SQL Scripts may also be run from the SQL Database Manager.

M. Diagnostic Window:

1. There shall be a Diagnostic Window available to aid in system diagnostics / troubleshooting. Once a Controller is selected, the Standard Setup and Status diagnostic commands may be selected from a drop down list and sent to the selected controller. The response from the controller is displayed in the Diagnostic Window, and may be viewed, copied to the clipboard, a Report created and printed or saved to a file.

2. In addition, any supported DIGITRAC Command can be sent to the selected controller.

N. Status Viewer

1. There shall be a Status Viewer which displays in a spreadsheets type format, the real-time status of all or selected Doors, Readers, Inputs, Relays, Expansion Inputs, Expansion Relays. Devices may be grouped in to “Status Groups”, which are selectable from a drop down list. Devices may have selected information displayed. The available list includes the following:

a. Name and Address
b. Status
c. Alarm and Acknowledged Status
d. Masking Status
e. Line Module Input Status and Type
f. Relay Status
g. Revision Number
h. Enabled Status
i. Controller Alarm Relay, Tamper, and Battery Status.

O. Alarm Viewer

1. The Alarm Viewer shall have 4 panes: Alarm, Acknowledged Alarms, Instructions, and Comments. At the bottom of the Main Console display are counters to indicate Active Alarms, Acknowledged Alarms, and Off Normal Conditions. Double clicking the Counter will launch the Alarm Viewer. The Alarm Viewer may also be manually launched, or automatically in the event of a new alarm occurrence. Alarm Viewer properties that may be configured include:

    a. Require Acknowledgement Before Clearing
    b. Auto Acknowledge on RTN (Return to Normal)
    c. Require Entry of Note on Acknowledgement
    d. Force New Note on Multiple Acknowledgements
    e. Require Entry of Note on Clear
    f. Force New Note on Multiple Clear
    g. Restore Alarm Viewer on New Alarm
    h. Specify the number of Cached Alarms to Load at Launch of Alarm Viewer

2. Foreground, Background, Alarm, and Secure colors may be changed. In addition, the Columns of data viewed in the Alarm and Acknowledged windows may be selected and the sequence in which they will appear. The available columns include:

    a. ICON
    b. Controller Time
    c. Host Time
    d. Description
    e. Address
    f. Level
    g. Alarm ID
    h. Acknowledge Time and Acknowledged By (available for the Acknowledged Pane)

3. Tool bar ICONS shall include:

    a. Acknowledge Selected
    b. Clear Selected

c. Acknowledge All
d. Clear All
e. Silence Beeper
f. Add Note

4. Right Clicking an Alarm Event shall display a list of available options, including:

a. Acknowledge
b. Clear
c. Acknowledge All
d. Clear All
e. Silence Beeper
f. Add Note
g. Go To Graphic
h. Display User Photo
i. Replay WAV file

P. Event Viewer

1. The Event Viewer can display all or Filtered Transactions. Custom filers may be defined and selected, or Standard selections can be made for main categories of Event types. Column width, order, selection, and scrolling direction are user definable, as well as text and background color.

2. The number of cached events to load when launched, up to 10,000, may be defined. The Operator shall be able to scroll back in time to view events no longer seen on the screen, without the need for running a report.

Q. Browser

1. The shall be a Internet Explorer like “Browser” for accessing on-line help, tutorials (AVI files), manuals, Known Issues, and Product Registration information.

R. Customization Manager

1. There shall be a Customization Manager that allows the Operator to define an alternate language or change the English name or label for each element of the software.

2. Audio WAV files may be defined for playback when a particular Alarm Type is active.

3. Priority Levels may be defined (1-99) for each Alarm Type.

4. Operator Instructions per Alarm Type shall be user definable.

S. Report Manager

1. The Report Manager shall allow the Operator to select from a number of pre-defined Reports. Custom Reports can be created

outside the software, and added to a Custom folder, making the Custom Reports available from within the Report Manager application.

2.

3. Once a Report is selected, the default Criteria and Sorting options may be used, or custom Criteria and Sorting options may be selected.

4.

5. Once the report is run, it may be viewed, printed, or saved in various standard file formats.

6.

7. Standard Reports included as standard shall include:

a. Customization Reports

1) Component Resources
2) Customizations Report

b. DIGI*TRAC Configuration

1) Controllers
2) Doors
3) Expansion Inputs
4) Expansion Relays
5) Inputs
6) Network Layout
7) Printers
8) Readers
9) Relays

c. History Logs

1) Active Alarms by Date
2) Alarm Log by Date
3) Alarm Log by Date with Comments
4) All Events Log
5) External Events Log
6) Internal Events Log
7) Operator Log
8) User Activity Log

d. Person Information

1) Credential Status
2) Door Access by Person
3) Dossier Style by Person
4) Expired and To-Be-Expired Person Access
5) Expired Credentials
6) Last Access by Person
7) Person Access and Function Group Summary
8) Person Access and Function Group Summary

with Codes and Cards
9) Person Access by Door
10) Person Access Summary
11) Person Access Summary with Codes and Cards
12) Person FG Summary with Codes and Cards
13) Person Function Group Summary

e. Velocity Configuration

1) Command Sets
2) Door Groups
3) Function Group Extensions
4) Functions Groups with Users
5) Functions with Users
6) Holiday Schedules
7) Holidays
8) Operator Groups
9) Operators
10) Time Zones – Grand Master Time Zone
11) Time Zones – Master Time Zone
12) Time Zones – Standard Time Zone
13) Time Zones – Standard Time Zones in Use

T. CCTV Interface: System Software shall allow the ability to define, view, monitor, and control the CCTV system. Simulated Alarms can be sent to the switcher, as well as Tours, Presets, select a specific camera, Grab and Store a CCTV image, and pan/tilt/zoom/iris controls for the selected camera. In addition, one or more Triggers and Actions can be defined for each camera.

U. Console Preferences: The Console Preferences shall define specific settings or devices for use with Velocity. These shall include: File Paths; Fonts to use in the Alarm and Event Viewers; Show Splash Screen on Startup; Access and Enable Customized Values for Components in Customization Manager; Use 24-Hour Time Format; SQL Server and Network Connections settings; Enrollment Station properties; Report, Badging, and Alarm/Event Printer properties; CCTV Properties.

V. DIGI*TRAC Configuration: This function shall contain the required definition of the hardware components of the system. The database files shall be based on the hierarchy of the system hardware as it is physically installed in the field.

W. Controller Properties: Controller Properties shall define all General settings for the Controller. These setting will include: Name, Type, Address, Local Time Zone, Enabled Status, Firmware Revision Number and Date, Expansion Option Boards Installed and available Hardware. All additional Controller Setup Options can be defined here and are detailed in the Firmware Features section below.

X. Controller Device Properties: The Controller Device Properties shall define all connected field devices, including: Doors, Readers, Inputs, Relays, Expansion Inputs, and Expansion Relays. Device names and all

operating parameters shall be definable if operation other than the included defaults is required.

Y. Graphics

1. The Graphics application shall allow the Operator to add, delete or modify graphic floorplans and add indicator icons to graphic floorplans that represent Controllers, input/output points, readers, or cameras located in the facility. Formats for Graphics supported include:

2. There shall be two Modes, Live and Design. The Live mode shall be used for real time monitoring. In addition, right clicking an ICON presents the Operator with a list of available Access or Control Functions that can be issued to the device. The Design mode allows the Operator to Define which Graphics are to be used, place ICONS on the Graphics, and define properties for each ICON.

3. There shall be a Bird's Eye Viewer that provides a key plan that can be panned and scrolled by moving the red box, which indicates the current viewing area.

4. There shall be a Directory of available Graphics to easily select the desired Graphic to display.

5. The Graphics application shall display the real-time state and condition of Alarm Points and Doors. The Door ICONS shall enlarge and change from a closed door ICON to an Open door ICON, representing that the door is open. When the door is closed, a closed ICON will appear again. The Alarm ICONS shall enlarge and change from a closed contact ICON to an Open contact ICON, representing that the alarm device is active. When the Alarm Device is restored to it's normal condition, a closed contact ICON will appear again. The ICON will also display the Device Name and Alarm Condition that caused it to go into an Alarm condition. The Color of the ICON will also change based on whether it is in alarm or secure.

Z. Badge and Graphics Designer

1. The Badge and Graphics Designer shall allow the Operator to create and customize an unlimited number of Badge Templates that may be assigned to a Person in the Enrollment Manager and create Backdrops to be used in the Graphics module.

2. An Object Toolbar shall be available for selecting Objects to appear on the Badge Template or Backdrop, including: Bit Map Logos, Photos, Fixed Text, and Database Fields. Each Object shall have a Properties box where the specific Properties of that Object are defined, including: File, database field, Font color, Font Style, Font Size.

AA. Enrollment Manager

1. The Enrollment Manager application shall maintain information

related to a Person, and Credentials assigned to that person. Multiple Credentials per person shall be supported. The list of People shall be able to have Custom filters applied, allowing for quick and easy grouping of desired people. There shall be a quick find option for finding a specific person or credential.

2. The Personal Information pane shall include the General and Additional User Defined fields. The system shall be capable of defining up to 36 user definable fields of information per Person. These field names can be either a “Text Box”, “Dropdown” where the Operator can enter text, or select from a Dropdown List, or a “Dropdown List” where selecting from the List is required. A Photo field shall be available for acquiring a live video image, acquire an image from a TWAIN device, or acquiring a photo from an existing file. A Record Last Updated field shall be available, as well as Preview and Print a Badge. A signature field shall also be available.

3. Once a person is added, one or more Credentials may be added to that Person. Credentials may be added using a Credential Template, or directly without a Credential Template. The Credential will take on the properties of the Credential Template if used. There shall be a Card Enrollment Station used for entering card data into the system. PIN Numbers can either be randomly selected, or Operator/User selected.

4. Once a Person is selected from the List, the Credential Status and information is displayed for the assigned Credentials. The information includes: IDF, ID, Function, Description, Status, Expires On, Last Access, Last Door, Tag, and Alert. An Operator may right click on a Credential, and will be presented with the following options: Tag, Alert, Disable, Forgive Passback, Override Code Tamper, Reset Limit Count, Force Download, Unassign, Delete, and Properties.

5. The bottom of the Enrollment Manager window shall display counters for: People, Assigned Credentials, Unassigned Credentials, and Guest Credentials.

2.5 HARDWARE REQUIREMENTS

A. Controllers: Primary controllers: 8 door - Hirsch Model VM8N ; alarm monitoring (16 supervised inputs - Hirsch Model VM16N; and relay control (1-32 relay Hirsch Model VMSPN-8R with the addition of REB8 relay expansion boards and (1-64 relay - Hirsch Model VMSPN-64R. Each controller shall have the following common features.

B. Controller Board: The controller board shall be microprocessor based, incorporating Flash ROM (firmware) downloadable from the Host Computer, RAM (User Information, System Setups, Event Transaction Buffer) and a Clock/Calendar. The ROM shall be modularly upgradeable in the field for enhancements to system features. All powered connections to the controller board shall be protected by fuses. All wiring connections to the controller board shall be to "Phoenix" type screw terminals. Each door connection shall consist of terminals for two readers, one 10 Amp rated Form C dry output relay for lock control, and

one input for monitoring a status switch, a request-to-exit device, and a tamper switch. There shall be status indicator lights for active relays, as well as diagnostic indicator lights to aid in system troubleshooting. There shall be dedicated alarm output relay/s for external reporting of the following conditions: Alarm; Duress; Tamper; and Trouble.

C. Enclosure: The controller enclosure shall be a NEMA style metal cabinet designed for surface mounting. It shall have a tampered, removable hinged door with a high security key lock. It shall have conduit knockouts to allow from 1/2" to 1" EMT conduit to be used for wire entry into the cabinet.

D. Internal Power Supply: The controller shall have an internal power supply that will accept 50 Hz/ 200 - 240 VAC, or 60 Hz/100 - 120 VAC. The primary side of the power supply shall be protected with a fuse. The power supply shall provide 28 VDC power to the controller board, internal battery charger, selected card readers, and reader interface boards.

E. Standby Battery: The controller shall have an internal standby battery that is capable of running the system during AC power interruptions. It shall be recharged by a charging circuit incorporated into the controller board.

F. Expansion Options: A maximum of 5 expansion boards can be installed in each controller, with the exception of 4 in the Model VMSPN-64R. A SNIB (SCRAMBLE*NET Interface Board) is included with each controller with the “N” designation in the part number and takes up one of the available expansion slots.

G. Alarm Inputs: The controller shall be capable of accepting up to 32 additional supervised alarm inputs, in increments of 8. The sensitivity of the line supervision shall be 2%. The alarm expansion boards shall be mounted in the controller cabinet and connect to the controller board via an expansion bus cable. This option shall be limited to 16 additional supervised alarm inputs for the 16 zone alarm input controller (Model VM16N). The alarm expansion board shall be Hirsch Model AEB8.

H. Relay Output: The access control (Model VM8N) and alarm monitoring (Model VM16N) controllers shall be capable of accepting up to 32 additional Form C, 2 Amp rated relay outputs in increments of 8. The 1 - 32 relay controller (Model VMSPN-8R) shall accept up to a maximum of 24 additional Form C, 2 Amp rated relay outputs in increments of 8. The 1 - 64 relay controller (Model VMSPN-64R) shall not accept any additional relay outputs. These outputs shall be used for control applications other than standard door access, such as elevator floor control, local door annunciators, HVAC interface, etc. The relay expansion boards shall be mounted in the controller cabinet and connect to the controller board via an expansion bus cable. The relay expansion board shall be Hirsch Model REB8.

I. CODE/Buffer: The controller shall be capable of expanding the CODE database up to a maximum of 132,00 Users with the addition of a memory expansion board. The board shall be mounted in the controller cabinet and connect to the controller board via an expansion bus cable. The CODE/Buffer expansion board shall be Hirsch Model MEB\CB64

(64,000 Users) or the MEB\CB128 (128,000 Users). Both Expansion Boards shall expand the Buffer capacity as well as the Code record capacity. The Model VM1N shall not accept any CODE/Buffer Expansion board.

J. Event Transaction Buffer: The controller shall be capable of expanding the event transaction buffer up to a maximum of 20,000 events and 2,000 alarms with the addition of a memory expansion board. The board shall be mounted in the controller cabinet and connect to the controller board via an expansion bus cable. The event transaction buffer expansion board shall be Hirsch Model MEB\BE.

K. Intelligent Reader Interface: The control panels shall utilize an intelligent reader interface (Hirsch MRIA or MRIB) to communicate with card readers of various types. The interface shall be microprocessor based and allow data formats including ABA magnetic stripe, Wiegand (26 to 55 bit), Proximity, Bar Code, Touch Memory, Barium Ferrite, RF and Biometric. The interface shall utilize a digitizing algorithm, which will convert the card data to a unique number, thus, eliminating the need for facility codes. A single interface shall support both entrance and exit readers with keypads associated with each door. The interface shall be U.L. Listed to U.L.294. The reader interface shall be included as standard in all Scramble Pads.

2.6 CONTROLLER FIRMWARE

A. General Features

1. The software for the controller shall reside in Flash ROM (firmware) and be located on a plug removable module on the controller board to facilitate easy field upgradability of the features. All of the necessary software for a fully functional System is located in the controller. The controller firmware shall include the following general features at a minimum and be fully supported by the VELOCITY head-end.

   a. 3 - 15 digit keypad Code's
   b. Duress digit for keypad Code's
   c. 150 Time Zones for access restriction and automatic event control
   d. 128 Access Zones for access management
   e. 256 Control Zones for alarm and relay management
   f. 366 programmable holidays this year, 366 days next year. Each Holiday may be assigned to 1 – 4 Holiday Schedules.
   g. Automatic daylight savings time clock adjustment
   h. 27 different functions for Code's and cards, e.g. access, unlock, re-lock, alarm mask, relay control
   i. Add user records
   j. Tag users for annunciation at host computer
   k. 4,000 Users
   l. 750 event, 750 alarm transaction buffer

B. Access Control Features

1. The controller shall include the following access control features at a minimum.

   a. Restrict access by: time of day; day of week; door; holiday
   b. Momentary Access of door up to 8100 seconds
   c. Extended Access for User Definable Momentary Access duration (requires ScramblePad). ScramblePad will display time remaining on the minute, and annunciate at the defined “Warning Time”
   d. Special Needs Time Extension to provide additional time for Momentary Access and Door Open Too Long for selected people.
   e. Unlock/Re-lock of door by CODE, card or Time Zone
   f. Door status monitoring shall allow for: door forced monitoring; door-open-too-long monitoring; door-open-too-long while door is unlocked; auto-re-lock of door when opened or closed
   g. Request-to-exit masks alarm and/or unlocks door
   h. 2 person requirement by door. A user can be defined as Normal, A/B Rule A, A/B Rule B, Executive Override. Can be disabled by Time Zone.
   i. 63 Passback Zones. Can be disabled by Time Zone. A User can designated with Passback Executive Override.
   j. Use Count limits on users
   k. Absentee Rule limits on users
   l. Temporary Day limits on users
   m. Occupancy Counting / Minimum & Maximum limits per Passback Zone
   n. Deadman CODE / Timer
   o. Threat Levels – 99 Levels may be defined. Based on the Level in effect for the facility, selected readers may be disabled, dual readers in Card/Code Only During Time Zone can require dual, and selected User’s Credentials can be disabled.

C. Alarm Management Features

1. The controller shall include the following alarm management features at a minimum.

   a. Momentarily mask alarm by CODE and/or card
   b. Mask/unmask alarm by CODE and/or card or by Time Zone
   c. Alarm device supervised while masked
   d. Tamper switch on alarm device monitored while masked
   e. Tamper Input may be configured to operate as a “Latch Monitor” with the appropriate door lock hardware.
   f. Entry/Exit delay per alarm input
   g. Alarm input triggers relay/s

D. Relay Control Features

1. The controller shall include the following relay control features at a minimum.

a. CODE and/or card, input, or other relay triggers relay/s
b. Trigger relay/s by time zone
c. Relay may be normally de-energized or energized
d. Disable relay/s during time zone
e. Clear relay at end of time zone

2.7 CARD READER/KEYPAD SPECIFICATIONS

A. Specifications

1. 3 to 8 digit user codes
2. Code tamper alarm
3. Proximity card format to match existing distributed cards
4. 2 pair stranded, twisted, overall shield wiring.
5. 7 segment display, white incandescent.
6. 7 tone prompt on start, 1 tone feedback for each button pressed.
7. 4 LEDs Red, Green, Yellow, Yellow
8. Operating power – 24VDC @ 50 mA non-illuminated, 250 mA illuminated.
9. Scrambleprox read range – 1.4 to 2.0 inches
10. Operating temperature 0 to 140 degrees F
11. Accessories included:

a. MB2 backbox and UMK universal mounting kit for ADA compliance.
b. MB5 and MP41 for gate entry reader.

B. Acceptable model

1. DS47L-SPX-HI

PART 3 - EXECUTION

1.1 INSTALLATION

A. Install system in accordance with manufacturer's instructions.

B. Install wiring for detection and signal circuit conductors in conduit. Use 22 AWG minimum size conductors.

C. Make conduit and wiring connections to door hardware devices as required.

1.2 TRAINING

A. The designated System Administrator shall attend the 3 Day Factory Velocity User Class.

B. The Dealer shall coordinate with the System Administrators for two 4 hour Operator training sessions on the Operational System to be

conducted on-site on the actual running system.

1.3 FIELD QUALITY CONTROL

A. Test in accordance with Hirsch Electronics testing procedures for the "Velocity for Windows 2000".

END OF SECTION

28 20 00 Electronic Surveillance

01 Security
- a. All security alarms shall be ADEMCO Vista 50 P.
- b. Wire size is 22 gauge stranded wire.
- c. Conduit shall be sized by Owner per project. Contact Facility Management alarm specialist. (623) 930-2648

28 30 00 Electronic Detection and Alarm

28 31 00 Fire Detection and Alarm

01 Fire Alarm Systems
- a. Provide a Class A system.
- b. Provide schematic drawings, operation and maintenance catalogs.
- c. For smoke detectors, use the digital type.
- d. Avoid rate of rise and fixed temperature heat detectors. Generally, use electronic thermistor type. For hazardous locations, use rate compensated type.
- e. Limit circuit load to 75% of circuit ampacity.

02 Individual Facilities
- a. Fire Stations
  - 1) Interlock door operations in apparatus bay with exhaust fans, evaporative coolers, and heaters.
  - 2) When a door opens, exhaust fans and evaporative coolers shall come on and heaters shall go off; operate on a timer set for a minimum of 15 minutes, depending on the air exchange.
  - 3) Provide a schematic for the magnetic starter, timer, low voltage relays, and H/O/A switch. Louver for exhaust operation located in rear doors.
  - 4) Apparatus bay receptacles shall be GFCI, 36" above finished floor.
  - 5) tall minimum of duplex receptacles in bedrooms – in some instances the Fire Department may elect to install quadraplex receptacles in some bedrooms.
- b. Libraries
  - 1) Design and coordinate so that fluorescent electronic ballasts are not installed within 10-15 feet of a magnetic detection system.
  - 2) If electronic ballasts are installed within 10-15 feet of a magnetic detection system, the system's operation may be impaired.

28 40 00 Electronic Monitoring and Control

28 50 00 Reserved - Not used

28 60 00 Reserved - Not used

28 70 00 Reserved - Not used

28 80 00 Reserved - Not used

28 90 00 Reserved - Not used

DIVISION 31 - EARTHWORK

31 10 00 Site Clearing

- 31 11 00 Clearing and Grubbing
- 31 12 00 Selective Clearing
- 31 13 00 Selective Tree and Shrub Removal and Trimming

31 20 00 Earth Moving

- 31 22 00 Grading
- 31 23 00 Excavation and Fill
- 31 25 00 Erosion and Sedimentation Controls

31 30 00 Earthwork Methods

- 31 31 00 Soil Treatment
- 31 32 00 Soil Stabilization
- 31 34 00 Soil Reinforcement
- 31 35 00 Slope Protection
- 31 36 00 Gabions
- 31 37 00 Riprap

31 40 00 Shoring and Underpinning

31 50 00 Excavation Support and Protectioin

31 60 00 Special Foundations and Load-Bearing Elements

- 31 62 00 Driven Piles
- 31 63 00 Bored Piles
- 31 64 00 Caissons
- 31 66 00 Special Foundations

31 70 00 Tunneling and Mining

31 80 00 Reserved - Not used

31 90 00 Reserved - Not used

DIVISION 32 - EXTERIOR IMPROVEMENTS

32 10 00 Bases, Ballasts and Paving

01 Refer to City of Glendale Engineering Standards. Copy of standards in Portable Document Format may be obtained online at Engineering Design Standards

32 11 13 Base Courses

32 12 00 Flexible Paving

32 13 00 Rigid Paving

32 14 00 Unit Paving

32 15 00 Aggregate Surfacing

32 16 00 Curbs and Gutters

32 17 00 Paving Specialties

32 17 13 Parking Bumpers

32 17 23 Pavement Markings

32 18 00 Athletic and Recreational Surfacing

32 20 00 Reserved - Not used

32 30 00 Site Improvements

32 31 00 Fences and Gates

32 31 13 Chain Link Fences and Gates

32 31 19 Decorative Metal Fences and Gates

32 32 00 Retaining Walls

32 34 00 Fabricated Bridges

32 35 00 Screening Devices

32 40 00 Reserved - Not used

32 50 00 Reserved - Not used

32 60 00 Reserved - Not used

32 70 00 Wetlands

32 80 00 Irrigation

32 90 00 Planting

01 Landscape and irrigation plans shall include long term and short-term maintenance plans.

02 Abide by all pertinent City Development Standards and the Native Plant Use ordinance in the Land Use Code for landscape plant materials, landscape plan content and specifications, landscaping and screening standards and Native Plant Preservation Standards

03 Hedges, cactus, etc. to buffer walls from graffiti.

04 Trees with leaves and needles to be planted away from roofs/gutters.

05 Refer to CPTED principals, section 00 79 13, for security issues in landscape conditions.

32 91 00 Planting Preparation

01 Refer to the City of Glendale Landscape Ordinance for requirements.

32 92 00 Turf and Grasses

01 Refer to the City of Glendale Landscape Ordinance, Engineering Standards and the City of Glendale Non-residential Landscape Ordinance, Sec. 19-66. Turf related facilities (over ten acres) must comply with current Arizona Department of Water Resources regulations.

32 93 00 Plants

32 94 00 Planting Accessories

32 96 00 Transplanting

DIVISION 33 - UTILITIES

33 00 01 Design Standards

01 Refer to City of Glendale Engineering Standards. Copy of standards in Portable Document Format may be obtained online at Engineering Design Standards

02 Identify utility requirements and demarcation line between utility delivery and project infrastructure.

03 Artificial lakes and fountains should display water conservation signage that indicates the use of reclaimed water and/or re-circulating systems. Signage would read – “As part of the city’s water conservation program, this fountain uses a re-circulating pump and reclaimed water. Non-potable – do not drink.”

33 08 00 Commissioning of Utilities

33 10 00 Water Utilities

33 20 00 Wells

33 30 00 Sanitary Sewerage Utilities

33 40 00 Storm Drainage Utilities

33 41 00 Storm Utility Drainage Piping

33 42 00 Culverts

33 44 00 Storm Utility Water Drains

33 45 00 Storm Utility Drainage Pumps

33 46 00 Subdrainage

33 47 00 Ponds and Reservoirs

33 49 00 Storm Drainage Structures

33 50 00 Fuel Distribution Utilities

31 51 00 Natural Gas Distribution

31 52 00 Liquid Fuel Distribution

33 56 00 Fuel-Storage Tanks

33 60 00 Hydronic and Steam Energy Utilities

33 70 00 Electrical Utilities

33 70 01 APS Service Requirements

01 Contact:

Customer Construction West
Linda Parks, Design Project Leader
Phone: 623-975 5742

Delivery Address: 16800 N. Dysart Road
Surprise, AZ 85374

Mail Address: APS
P.O. Box 53933
Mail Station 4620
Phoenix, AZ 85072
Phone: 623-975-5740
Fax: 623-975-5748

02 Provide the following information:

a. Complete set of plans, on disk if available [AutoCAD].
b. Copy of the recorded deed with exhibits.
c. Building Permit.
d. Dedication showing water and sewer easements.
e. Property surveyed and corner pins in place.
f. Load calculations in writing.
g. Project site plan.
h. Civil grading and drainage plans.
i. Vicinity map.
j. Exact address of project.
k. If a government project, copy of purchase order.

03 Once APS has received the requested information, they will proceed with the electrical design for the project. Allow up to twelve (12) weeks for design, survey, right-of-way and construction to be completed. If changes are made to the plans that affect the electrical design, a re-design will be provided for a fee.

33 71 00 Electrical Utility Transmission and Distribution

33 72 00 Utility Substations

33 73 00 Utility Transformers

33 75 00 High-Voltage Switchgear and Protection Devices

33 77 00 Medium-Voltage Utility Switchgear and Protection Devices

33 79 00 Site Grounding

33 80 00 Communications Utilities

33 81 00 Communications Structures

33 82 00 Communications Distribution

33 83 00 Wireless Communications Distribution

33 90 00 Reserved - Not used

DIVISION 34 - TRANSPORTATION

34 00 00 Transportation

34 01 00 Operation and Maintenance of Transportation

34 01 33 Operation and Maintenance of Railroads

01 For work located in the vicinity of an airport or other facility controlled or overseen by the Federal Aviation Administration, contact FAA for special stipulations for facility design and conduct of construction operations prior to committing to a design so that any special requirements can be incorporated in the contract documents.

34 10 00 Guideways/Railways

34 11 00 Rail Tracks

34 40 00 Transportation Signaling and Control Equipment

34 41 00 Roadway Signaling and Control Equipment

34 41 13 Traffic Signals

34 41 16 Traffic Control Equipment

34 41 23 Roadway Monitoring Equipment

34 42 00 Railway Signaling and Control Equipment

34 43 00 Airfield Signaling and Control Equipment

34 50 00 Transportation Fare Collection Equipment

34 52 00 Vehicle Fare Collection

34 54 00 Passenger Fare Collection

34 60 00 Reserved - Not used

34 70 00 Transportation Construction and Equipment

34 80 00 Bridges

DIVISION 35 - WATERWAY AND MARINE CONSTRUCTION *Not used*

DIVISION 40 - PROCESS INTEGRATION *Not used*

DIVISION 41 - MATERIAL PROCESSING AND HANDLING EQUIPMENT *Not used*

DIVISION 42 - PROCESS HEATING, COOLING AND DRYING EQUIPMENT *Not used*

DIVISION 43 - PROCESS GAS AND LIQUID HANDLING, PURIFICATION AND STORAGE EQUIPMENT *Not used*

DIVISION 44 - POLLUTION CONTROL EQUIPMENT

44 10 00 Air Pollution Control

01 Where air pollution control equipment is required, equipment shall be specified, installed and maintained in accordance with federal, state and local laws and regulations.

44 20 00 Noise Pollution Control

44 30 00 Not used

44 40 00 Water Treatment Equipment

44 50 00 Solid Waste Control

44 60 00 Reserved - Not used

44 70 00 Reserved - Not used

44 80 00 Reserved - Not used

44 90 00 Reserved - Not used

DIVISION 45 - INDUSTRY-SPECIFIC MANUFACTURING EQUIPMENT *Not used.*

DIVISION 48 - ELECTRICAL POWER GENERATION *Not used.*