

NOTICE TO CONTRACTORS
CARSON CITY PURCHASING AND CONTRACTS
201 NORTH CARSON STREET, SUITE 3
CARSON CITY, NEVADA 89701
775-283-7137 / FAX 775-887-2107
<http://www.carson.org/Index.aspx?page=998>



ADVERTISED BID #1415-019
BID TITLE "Fleet Facility Expansion"
Labor Commissioner PWP# CC-2014-289
Engineer's Estimate: \$1,039,540.36

PLEASE NOTE: Carson City has extensively revised these Contract Documents and all Bidders are advised to read these documents thoroughly before submitting a bid.

SUMMARY

The Fleet Facility Expansion Project consists of adding office space and two maintenance bays to the existing Fleet Facility located at 3303 Butti Way. The project also consists of additive alternates to include new trench drains in the existing facility, a new wash bay, upper level interior finishes, concrete aprons on the north and south side of the new facility expansion, demolition of the existing interior two-story office/restroom wood structure, and mechanical and electrical work in the existing building. The project is subject to the Buy America provisions of 49 U.S.C. 5323(j) and 49 C.F.R. Part 661. Compliance with 49 CFR Part 26, Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs is required. The project includes all common phases of construction customarily associated with this type of project. Sealed bids must be submitted in accordance with the bid documents, drawings and plans, specifications and special conditions related hereto.

CONTRACTOR'S LICENSE: This is a Federal-aid contract and the requirements for such shall apply. On a Federal-aid contract, any Contractor otherwise qualified by the State of Nevada to perform such work is not required to be licensed nor to submit application for license in advance of submitting a bid or having such bid considered, provided, however, that such exception does not constitute a waiver of the State's right under its license laws to require a Contractor, determined to be a successful bidder, to be licensed to do business in the State of Nevada in connection with the award of the contract to him.

BID DOCUMENTS may be obtained as follows and the cost is non-refundable.

You may download this Bid Document, excluding the drawings, and a pdf version of the Bid Bond and Bid Proposal to prepare your bid from the Carson City website <http://www.carson.org/Index.aspx?page=998>. Downloading this bid document from the website does not put you on the plan holders list, you must click the link at the bottom of the page and provide your information to add your company name to the plan holders list.

You may purchase the drawings separately from the following businesses, please call ahead to place your order.

Nevada Blue, 3246 North Carson Street, Carson City, NV 89706 (775) 883-6011 www.nvblue.com

OSI, Inc., 4750 Longley Lane, Suite 103, Reno, NV 89502 (775) 827-4343 www.osireno.com

Sierra Contractor's Source, 860 Maestro Dr., Suite B, Reno NV 89511 (775) 329-7222
www.scsplanroom.com

INSPECTION OF BID DOCUMENTS: All documents related hereto may be viewed at the following locations:

CARSON CITY PUBLIC WORKS DEPARTMENT, 3505 Butti Way, Carson City, Nevada 89701.

ADDENDA: All addenda are posted on Carson City's website <http://www.carson.org/Index.aspx?page=998>. It is each bidder's responsibility to ensure that they have received all addenda prior to submission of their sealed bid.

QUESTIONS regarding this bid must be received a minimum of four (4) days prior to bid opening.

SEALED BIDS must be submitted in a sealed envelope which shall be clearly marked with title and number of this Bid Document to Carson City Purchasing and Contracts Department, 201 North Carson Street, Suite 3, Carson City, Nevada 89701, by not later than 11:00 a.m. on September 10, 2014. Bids received after the date and time set for receipt will be **REJECTED** and returned to the bidder unopened.

BID OPENING will be held publicly at 11:10 a.m. on September 10, 2014, at 201 North Carson Street, Suite 3, Carson City, Nevada 89701. Bidders, their representatives, and all other interested persons may be present during the bid opening.

A tabulation of the **BID PROPOSALS** will be posted on Carson City's website within 48 hours.

AWARD RECOMMENDATION will be made by the Carson City Purchasing and Contracts Department. You are encouraged to visit the City's website for that recommendation or contact Kim Belt at KBelt@carson.org for the recommendation.

NOTICE OF PROTEST OF AWARD OF CONTRACT must be in compliance with NRS 338.142 and submitted in writing to the Carson City Purchasing and Contract Department of the Division of Finance (Department) at City Hall, 201 N. Carson Street, #3, Carson City, NV 89701 within five (5) business days after the date the Director of such Department or the City's Public Works Director, as the City's authorized representative, makes a recommendation to the award the contract.

The notice of protest must include a written statement setting forth with specificity the reasons the person filing the notice believes the applicable provisions of law were violated.

A person filing a notice of protest may be required by the City's Public Works Director or its Purchasing and Contracts Manager, at the time or soon after the notice of protest is filed, to post a bond with a good and solvent surety authorized to do business in this state or submit other security, in a form approved by such authorized representative of the City and the City shall hold the bond or other security until a determination is made on the protest. A bond posted or other security submitted with a notice of protest must be in an amount equal to the lesser of Twenty-five percent of the total value of the bid submitted by the person filing the notice of protest; or Two hundred fifty thousand dollars.

A notice of protest filed under these provisions operates as a stay of action in relation to the awarding of any contract until a determination is made by the City's Board of Supervisors on the protest.

A person who makes an unsuccessful bid may not seek any type of judicial intervention until the City's Board of Supervisors has made a determination on the protest and awarded the contract.

Neither the City's Board of Supervisors nor any authorized representative of the City or such public body is liable for any costs, expenses, attorney's fees, loss of income or other damages sustained by a person who makes a bid, whether or not the person files a notice of protest pursuant hereto.

If the protest is upheld, the bond posted or other security submitted with or soon after the submission of the notice of protest must be returned to the person who posted the bond or submitted the security. If the protest is rejected, a claim may be made against the bond or other security by the City's Board of Supervisors in an amount equal to the expenses incurred by the City or its Board of Supervisors because of the unsuccessful protest. Any money remaining after the claim has been satisfied must be returned to the person who posted the bond or submitted the security.

BID AWARD will be made by the Carson City Board of Supervisors and is scheduled for October 2, 2014 and their decision is final. The Carson City Board of Supervisors meeting will be held in the Sierra Room of the Carson City Community Center, 851 East William Street, Carson City, Nevada 89701 beginning at 8:30 a.m.

PRICES must be quoted FOB Carson City, Nevada and are valid for sixty (60) calendar days after the **BID OPENING**.

Signature in Project File

Kim Belt, CPM
Purchasing and Contracts Manager

Signature in Project File

Darren Schulz, Public Works Director

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INSTRUCTIONS TO BIDDERS

CORRESPONDENCE AND/OR COMMUNICATIONS:

The provisions of this contract shall be approved by the governing body of the City, and the normal lines of communications shall be between the following persons and the authorized representative of the Contractor:

A. Contract Administrator
Kim Belt, CPM - Purchasing and Contracts Manager
Carson City Purchasing and Contracts
201 North Carson Street, Suite 3
Carson City, Nevada 89701
775-283-7137
FAX 775-887-2107
KBelt@carson.org

B. Owner's Representative
Darren Schulz, Public Works Director
Carson City Public Works Department
3505 Butti Way
Carson City, Nevada 89701
775-887-2355
FAX No. 775-887-2112
DSchulz@carson.org

C. Construction Manager
Rick Cooley, Construction Manager
Carson City Public Works Department
3505 Butti Way
Carson City, Nevada 89701
775-887-2355
FAX No. 775-887-2112
RCooley@carson.org

NOTE: The City reserves the right to appoint a substitute designee for these positions at the City's discretion.

END OF DOCUMENT

INSTRUCTIONS TO BIDDERS

B.1 BIDDING PROCEDURES

A. Pre-bid Conference

If required, a Pre-bid Conference will be held at the time and place indicated on the Notice to Contractors. The purpose of this conference is to discuss the Project, prospective Bidders concerns, and key issues of the Project. Attendance is not mandatory unless otherwise indicated.

B. Designated Contacts

The designated contact for questions pertaining to the Contract Documents, Specifications and/or Drawings is the designated Contract Administrator. All questions should be submitted in writing, and will receive a written response from the Contract Administrator.

C. Contract Drawings

The Contract Drawings used for Bidding shall have the following title:

CONTRACT DRAWING TITLE: **“Fleet Facility Expansion”**

The Contract Drawings do not purport to show all the details of the Work. They are intended to illustrate the character and extent of the performance desired under the Contract; therefore, they may be supplemented or revised from time to time, as the Work progresses, by the Construction Manager. Drawing revisions and/or additional drawings or sketches will be made and furnished to the Contractor if they are deemed necessary to adequately illustrate the Work.

D. Interpretations and Addenda

Bidder shall take no advantage of any apparent error or omission in this Bid Document. In the event the Bidder discovers such an error or omission, he/she shall immediately notify the City’s Contract Administrator in writing or by email. Carson City will then make such corrections and interpretations as may be deemed necessary for fulfilling the intent of this Bid Document through the issuance of an Addendum. Any Addendum or clarification supplementing this Bid Document, the Drawings, and the Specifications, issued prior to the date and time set for the submittal of Bid Proposal shall be made part of the Contract.

If it becomes necessary to revise any part of this Bid Document, a written addendum will be provided to all plan holders. The City is not bound by any oral representations, clarifications, or changes made by Carson City employees, or representatives, unless such clarification or change is provided to all Bidders in written addendum form.

Addenda shall be sent by fax, e-mail or posted on the City’s website to all who are known by the City to have received a complete set of Bid Documents (plan holders). No Addendum shall be issued by Carson City less than two (2) working days prior to the advertised date and time for Bid submittal. **Note:** Bidders are requested to submit questions four (4) working days prior to the advertised date and time for Bid submittal.

Prior to submission of the Bid Proposal, each Bidder shall ascertain that he/she has received all Addenda issued. The Bidder shall acknowledge receipt of all Addenda by completing the acknowledgment space provided on the Bid Proposal.

E. Bid Preparation and Submission

1. Bid proposals are to be submitted on the Bid Proposal provided and must be manually signed by pen by an officer or authorized agent (with attached power of attorney) of the Bidder. All figures must be written in ink or typewritten. Figures written in pencil or erasures are not acceptable. Any interlineation or alteration must be initialed in ink by a person authorized to bind the Bidder to a Contract. If the person making said interlineation or alteration is not the same person who signs the Bid Proposal, such person must write his/her signature and print his/her name and title on each page of the Bid Proposal where initials appear. Written delegation of signature authority to an agent acting on behalf of the Bidder must accompany the sealed Bid and cannot contain any language which states the Bidder retains final approval of acceptance of any of the terms, conditions, specifications and/or finalized Contract.

INSTRUCTIONS TO BIDDERS

- Each Bid shall be submitted in a sealed envelope and the envelope must be prominently marked on the lower left corner as follows:

SEALED BID

BID NO.: 1415-019

OPENING: September 10, 2014 @11:10 a.m.

COMPANY NAME:

- Carson City will not consider a Bid that fails to comply with the above stated requirements. Carson City will not be responsible for the premature opening of a Bid not properly addressed or identified. All Bids must be received prior to the date and time specified in the Notice to Contractors at the following address:

**Carson City Purchasing and Contracts Department
201 North Carson Street, Suite 3
Carson City, Nevada 89701**

- If forwarded by mail, the sealed envelope containing the Bid must be enclosed in another envelope addressed as specified. Mailed Bids must be received by the Purchasing and Contracts Department prior to the closing date and time for receipt of Bids in order to receive consideration. Bids submitted by facsimile or email will not be accepted or considered.

F. Documents Necessary for Submittal

The Bid Bond, Bid Proposal Summary, Bidder's Preference Certificate of Eligibility (if applicable) and any other documents required as defined in the Special Conditions all shall be included in the sealed envelope. **Do not return the entire spec book with the Bid.** Carson City will not consider a Bid received if there is an omission of or failure to complete any portion of the required documents at the time of the Bid Opening.

G. Bid Security

- Each Bid Proposal must be accompanied by a Cashier's check, Certified Check, or Bid Bond acceptable to Carson City in an amount equal to at least five percent (5%) of the Bidder's "Base Bid" Proposal. Said Bid Security shall be payable without condition to Carson City as a guarantee that the Bidder, if awarded the Contract, will promptly execute such Contract in accordance with the Bid Proposal and, in the manner and form required by the Bid Document, and will furnish the required PERFORMANCE and PAYMENT bonds. (Refer to Documents # 2151 and 2152). Should the Bidder refuse to enter into such Contract or fail to furnish such bonds, the amount of the Bid Security may be forfeited to the City as liquidated damages, not as penalty. All checks must indicate the Payee as "Carson City, Nevada" and reflect the Bid Title and Number. Failure to enclose a Bid guarantee with the sealed Bid will cause the Bid to be rejected and not considered.
- Surety companies issuing bonds must be licensed to issue surety by the State of Nevada Insurance Division pursuant to NRS 683A.090 and issued by an appointed agent pursuant to NRS 683A.280. Bonds issued by an individual surety are not acceptable to the City.
- The City will have the right to hold the Bid Security of Bidders to whom an award is being considered until either: (a) the Contract has been executed and bonds have been furnished, (b) the specified time has elapsed so that Bids may be withdrawn, or (c) all Bids have been rejected.

H. Quantities

The quantities given in the Bid Document or indicated by the unit Bid items are approximate quantities and are intended to illustrate the Scope of Work. The Bidder shall be responsible for verifying the exact quantities involved each month through the measurement and payment provisions of the Bid Document.

INSTRUCTIONS TO BIDDERS

I. Compensation

The Total Bid Price shall cover all Work required by the Bid Document. All costs in connection with the proper and successful completion of the Work, including furnishing all materials, equipment, supplies, and appurtenances; providing all construction equipment, tools and temporary utilities; and performing all necessary labor and supervision to fully complete the Work, shall be included in the unit and lump sum prices Bid. All work not specifically set forth as a pay item in the Bid Proposal shall be considered a subsidiary obligation of the Bidder, and all costs in connection therewith shall be included in the prices Bid.

J. Schedule of Values

The purpose of the Schedule of Values shall serve the City in two (2) distinct areas:

1. **PRIOR TO AWARD OF BID:** Carson City may request a Schedule of Values for any or all item(s) included in the Bid Proposal for the purpose of determining an unbalanced Bid. The analysis shall be conducted by the City.
2. **AFTER AWARD OF BID** Carson City will request a Schedule of Values for any or all item(s) included in the Bid Proposal for the purpose of making partial payments to the Contractor.

Under no circumstances may any Bid item reflected as LUMP SUM or otherwise be increased or decreased as a result of the Lump Sum Bid breakdown analysis.

All prospective Bidders may be required to prepare a Schedule of Values, and it shall be the Bidder's responsibility to verify the quantities as shown on the Drawings before preparing his/her Bid. The schedule as shown on the Contract Drawings does not constitute a complete outline of the Work to be performed by the Contractor in accordance with the Contract Drawings and Specifications. This list is intended to include all major items, and the Bid computed therefrom will be the maximum compensation for all work and materials furnished by the Contractor in order to comply with the Contract Drawings and Specifications, whether or not indicated in the approximate quantities or pertaining to the items of Work listed therein.

K. Validity of Bid

Carson City reserves the right to withhold award of the Contract for a period of sixty (60) days from the date of the Bid opening. The Bidder acknowledges in submitting his/her Bid that all prices listed in the Bid Proposal are valid for a period of not less than sixty (60) days from the date of the Bid Opening.

L. Bidders Preference

~~Bidders submitting a proposal to a public body for a Public Work shall bear the responsibility to ascertain the relevancy of the "preference for certain contractors" referenced in NRS 338.147. Bidders claiming preference shall submit with their Bid Proposal the "Certificate of Eligibility" issued by the State of Nevada Contractor's Board as proof of Contractor's compliance with the provisions of NRS 338.147. Failure to submit the Certificate of Eligibility with your Bid shall result in a waiver of any Bidder preference.~~

~~**Note:** Pursuant to Subsection 8 of NRS 338.147, the provisions of Subsection 2 of NRS 338.147 do not apply to any Contract for a Public Work which is expected to cost less than \$250,000.~~

M. Bidders Representation

Each Bidder by submitting its Bid represents that:

1. The Bidder, signing the Proposal summary and submitting the bid represents that he/she has familiarized himself with the Notice to Contractors, Contract Drawings, Specifications, and Contract Documents and has found them fit and sufficient for the purpose of preparing his/her Bid. By submission of his/her Bid, he/she agrees to all the terms and conditions of the Bid Document and further agrees that no claim will be made against the City, the Construction Manager, or the Design Consultant for any damage that he/she or his/her subcontractors may have suffered due to the inadequacy of his/her Bid on account of any alleged errors, omissions, or other deficiencies in the Notice to Contractors, Drawings, Specifications, or Contract Documents supplied to him/her by the City.

INSTRUCTIONS TO BIDDERS

2. The submission of a Bid shall constitute an acknowledgment upon which the City may rely that the Bidder has thoroughly examined and is familiar with the Bid Documents. The Bidder shall in no way be relieved from any obligation with respect to its proposal or to the Contract. No claim for additional compensation will be allowed which is based upon a lack of knowledge of the Contract Documents.
3. The Bidder has inspected the site(s) of the Work and is satisfied, by personal examination or by other means, of the locations of the proposed Work, of the actual conditions, including subsurface conditions, of and at the site(s) of the Work. If, during the course of its examinations, a Bidder finds facts or conditions which appear to be in conflict with the letter or spirit of the Bid Documents before submitting his/her bid, the Bidder shall request the City, in writing, to provide additional information and explanation.
4. Submission of a Bid by a Bidder shall constitute conclusive evidence that the Bidder has relied on his/her own examination of (1) the site of the Work, (2) access to the site, (3) all other data and matters requisite to the fulfillment of the Work and on its own knowledge of existing facilities on and in the vicinity of the site of the Work to be constructed under the Contract, (4) the conditions to be encountered, (5) the character, quality and scope of the proposed Work, (6) the quality and quantity of the materials to be furnished, and (7) the requirements of the Bid, the Drawings and Specifications. The Bidder is aware that soil classifications do not represent any particular stability or drainability characteristics, and are aware that water table levels can vary.
5. The information provided by the City is not intended to be a substitute for, or a supplement to, the independent verification by the Bidder to the extent such independent investigation of site conditions is deemed necessary or desirable by the Bidder.
6. The Bidder, by signing the Bid Proposal, agrees that all material and workmanship on this Project shall meet or exceed OSHA standards and NOSHA standards.

Bidder must be duly qualified and possess the classification(s) of contractor's license stipulated by the City for this particular Work and issued by the Nevada State Contractor's Board. Nevada Contractor's License type, number, expiration date and dollar limit must be indicated on the Bid Proposal. The Bidders and the successful Contractors and their subcontractors shall comply with all provisions of NRS Chapter 624 and Nevada Administrative Code, Chapter 624. Carson City will not consider any Bid that fails to comply with these requirements.

The successful Bidder must obtain a valid Carson City Business License within ten (10) days after the award of the Contract, or the Contractor will be declared in default of the contract.

N. Fair Employment Practices

Pursuant to NRS 338.125, it is unlawful for any Contractor in connection with the performance of work under a contract with a public body, when payment of the contract price, or any part of such payment, is to be made from public money, to refuse to employ or to discharge from employment any person because of race, creed, color, national origin, sex, sexual preference, or age to discriminate against person with respect to hire, tenure, advancement, compensation or other terms, conditions, privileges of employment because of race, creed, color, national origin, sex, sexual preference or age.

O. Preferential Employment

Pursuant to NRS 338.130, Preferential Employment in Construction of Public Works, "In all cases where persons are employed in the construction of public works, preference shall be given, the qualifications of the applicants being equal: First: To honorably discharged Army, Navy, Air Force, Marine Corps or Coast Guard soldiers of the United States who are citizens of the State of Nevada; Second: To citizens of the State of Nevada". If the provisions of NRS 338.130 are not complied with by the Contractor, this Contract shall be void, and any failure or refusal to comply with any of the provision of NRS 338.130 shall render this Contract void.

P. Subcontracting

The Bidder agrees that he/she will perform work totaling at least Fifty per cent (50%) of the Bid amount and will not subcontract work totaling more than Fifty per cent (50%) of the Bid amount.

INSTRUCTIONS TO BIDDERS

The Bidder shall be bound by and comply with NRS 338.141 to limit the practice of shopping for Bids and shall provide a Subcontractors Listing with the submission of their Bid. The form must have the spaces filled in for each subcontractor who will be paid an amount exceeding five percent (5%) of the Bid amount. Within two (2) hours after the opening of Bids, the bidders who submitted the three lowest Bids must submit a list of names of each subcontractor who will provide labor or a portion of the Work or improvement to the Contractor for which he/she will be paid an amount exceeding one percent (1%) of the Bid amount or Fifty Thousand Dollars (\$50,000), whichever is greater

The bidder shall verify prior to submitting their Bid that all subcontractors specified are properly licensed. Substitutions of subcontractors specified in the Bid shall comply with the requirements of NRS 338.141.

Bidder agrees that if awarded the Contract, he/she will assume responsibility for acts or omissions of subcontractors and of persons either directly or indirectly employed by them, as they are responsible for the acts or omissions of persons directly employed by the Bidder. Nothing contained in the Bid Document shall create any contractual relationship between any subcontractor and the City.

Each Contractor engaged on a public works project shall report to the Labor Commissioner the name and address of each Subcontractor whom he/she engages for work on the project within ten (10) days after the Subcontractor commences work on the contract.

Substitutions for subcontractors listed in the Bid Proposal shall comply with the requirements of NRS 338.141.

Q. Site Information

Where investigations of surface or subsurface conditions have been made by the City, in respect to foundations or other structural design for design purposes only, said information is available only for the convenience of bidders but are not a part of the Bid Documents. The City, Construction Manager, and Design Consultant assume no responsibility whatsoever as to the sufficiency of borings, or of the log of test borings or other investigations, or tests, or of the interpretations thereof; there is no guarantee, warranty, or representation, expressed or implied, that the conditions indicated thereby, in fact, exist or are representative of those existing throughout the work. Such information available to bidders is not to be construed in any way as a waiver of the other provisions of this paragraph and bidders must satisfy themselves through their own investigations as to the surface and subsurface conditions to be encountered at the Site.

IB.2. OPENING OF BIDS

All Bids received at the designated time and place that comply with these requirements will be opened, publicly read aloud at the date, time and place set forth in the Notice to Contractors. Bidders, their representatives, and all other interested persons may be present at the opening and reading of Bids.

Any Bids received after the date and time set for receiving and opening Bids, as set forth in the Notice to Contractors and any Addendum, will not be considered. Any such Bids will be returned unopened to the Bidder.

A. Mistake in Bid

A request for withdrawal of a Bid due to a purported error shall not be considered unless it is given in writing to the Contract Administrator by the Bidder within forty-eight (48) hours after opening of the bid. Any such request shall contain a full explanation of any purported error and shall be supported by the original calculations on which the Bid was computed, together with a certification and notarization thereon that such calculation is the original as prepared by the Bidder or his/her agent.

In the case of a difference between written words and figures, the amount stated in written words shall govern for a Lump Sum Bid.

In the case of a difference between Unit Price and the Extended Price, the Unit Price shall govern.

B. Withdrawal of Bid

1. **Before Bid Opening** - A Bidder may request withdrawal of his/her, sealed Bid prior to the scheduled date and time of the scheduled Bid opening provided the request is submitted to the

INSTRUCTIONS TO BIDDERS

Contract Administrator's Office in writing or an authorized representative must present himself with proper identification to the Contract Administrator's Office and verbally request that the Bid be withdrawn.

2. **After Bid Opening** - No Bids may be withdrawn for a period of sixty (60) calendar days after the date and time of Bid opening, except as set forth in A above. All responsive and responsible Bids received are considered firm offers for the time period specified above and may be considered for award. The Bidder's offer will expire at the time specified above or upon acceptance by City, which occurs when the successful Bidder provides the bonds, insurance, and submits the signed Contract to the City for execution and the City executes the Contract.

IB.3 AWARD OF CONTRACT/REJECTION OF BIDS/DISQUALIFICATION OF BIDDERS

A. Award of Contract

Carson City will award the Contract pursuant to the provisions of Nevada State law including but not limited to:

- (a) Chapter 332 (Purchasing: Local Governments)
- (b) Chapter 338 (Public Works Projects)
- (c) Chapter 339 (Contractor's Bonds on Public Works)
- (d) Chapter 624 (Contractors).

B. Rejection of Bids

The City reserves the right to waive any informality or irregularity in any Bid received, and to reject any or all Bids. In the case of rejection of all Bids, the City reserves the right to advertise for new Bids or to proceed to do the Work otherwise if, in the judgment of the Carson City Board of Supervisors or Carson City Regional Transportation Commission, it is in the best interest of the City.

C. Irregular Bid

A Bid shall be considered irregular for the following reasons, any one or more of which may be cause for rejection:

1. If the Bid Proposal furnished by the City is not used or is altered.
2. If there are unauthorized additions, conditional or alternate Bids, or omissions or irregularities of any kind, which may tend to make the Bid incomplete, indefinite or ambiguous as to its meaning, or give the Bidder submitting the same a competitive advantage over other Bidders.
3. If the Bid submitted contains any erasures, interlineations, or other corrections unless each such correction is prepared and authenticated in acceptance with the provisions of Paragraph IB.1.E (1).

D. Unbalanced Bid

If the Unit Bid Item prices and/or schedule of values of a prospective Bidder's Bid are obviously unbalanced, either in excess or below the reasonable cost analysis values, in the opinion of the Owner's Representative, the Bid may be rejected. All Bids with separately priced line items shall be analyzed to determine if the prices are unbalanced. A bid may be rejected if the City determines that the lack of balance poses an unacceptable risk to the City.

A Bid with unbalanced pricing may increase performance risk and could result in payment of unreasonably high prices. Unbalanced pricing exists when, despite an acceptable total evaluated price, the price of one or more bid items is significantly over or understated as indicated by the application of cost or price analysis techniques. The greatest risks associated with unbalanced pricing occur when:

1. Over pricing of startup work, mobilization, or early items of work (front end loading) would cause a bidder to receive substantial up-front payment;
2. Base quantities and option quantities are separate line items;

INSTRUCTIONS TO BIDDERS

3. The quantities as bid are incorrect and the contract cost will be increased when quantities are corrected;
4. On items where the quantities may vary, if the anticipated variation in quantity would result in the lower Bidder not remaining as the low Bidder;

E. Disqualification of Bidders

Any one or more of the following may be considered as sufficient for the disqualification of a prospective Bidder and the rejection of the Bid:

1. The Bidder is not responsive or responsible;
2. The quality of the services, materials, equipment or labor offered does not conform to the approved Contract Drawings and specifications;
3. Evidence of collusion among prospective Bidders; (Participants in such collusion will receive no recognition as Bidders)
4. Lack of the contractor's license classification stipulated by Carson City for this Work;
5. More than one Bid for the same work from an individual, firm, or corporation under the same or different name;
6. Lack of competency, understanding of the scope of the Work, adequate machinery, plant and/or equipment as revealed by the requested experience or subcontractor information;
7. Unsatisfactory performance record as shown by past work for the City, judged from the standpoint of workmanship, progress, and quality of services/goods provided;
8. Uncompleted work which, in the judgment of the City, might hinder or prevent the prompt completion of additional work, if awarded;
9. Failure to pay or satisfactorily settle all bills due for labor and material on any contract(s);
10. Failure to comply with any requirements of the City;
11. Failure to list, as required, all subcontractors who will be employed by the Bidder;
12. Negative actions against the Contractor's license by the Nevada State Contractor's Board;
13. Any other reason determined, in good faith, to be in the best interest of the City.

IB.4 BID PROTESTS

A Bidder may file a Notice of Protest regarding the awarding of the contract in accordance with NRS 338.142 and the Notice to Contractors (NC) above, under "NOTICE OF PROTEST OF AWARD OF CONTRACT."

IB.5 BID PREPARATION EXPENSES

By accepting the Bid Proposal of the Bidder, the City assumes no obligation to reimburse the Bidder for Bid preparation expenses. No Bidder shall have any right or claim against the City for reimbursement of Bid preparation expenses.

IB.6 COLLUSION, DISCRIMINATION, AND/OR PRICE FIXING

The Bidder certifies that any and all prices which he/she may charge under the terms of the Contract do not, and will not, violate any existing federal, state or municipal laws or regulations concerning discrimination and/or price fixing. The Bidder agrees to indemnify, exonerate and hold Carson City harmless from liability for any such violation now and throughout the term of the Contract.

END OF INSTRUCTIONS TO BIDDERS

BID PROPOSAL

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that I/We _____

as Principal, hereinafter called Contractor, and _____

a corporation duly organized under the laws of the State of Nevada, as Surety, hereinafter called the Surety, are held and firmly bound unto Carson City, Nevada a consolidated municipality of the State of Nevada, hereinafter called City, for the sum of \$ _____ Dollars

(state sum in words) _____

for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid, identified as **BID #1415-019** and titled **"Fleet Facility Expansion"**.

NOW, THEREFORE if the City shall accept the bid of the Principal and the Principal shall enter into a contract with the City in Accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding or Bid Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such Contract and give such bond or bonds, if the Principal shall pay to the City the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the City may in good faith contract with another party to perform work covered by said bid or an appropriate liquidated amount as specified in the Invitation for Bids then this obligation shall be null and void, otherwise to remain in full force and effect.

Executed on this ____ day of _____ 2014

Signature of Principal: _____

Title: _____

Firm: _____

Address: _____

City/State/Zip Code: _____

Written Name of Principal: _____

ATTEST NAME

Signature of Notary: _____

Subscribed and sworn before me this _____ day of _____ 2014

(printed name of notary) _____ Notary Public for the State of _____

Claims Under this Bond May be Addressed to: Nevada Resident Agent Information
Complete for out of state bonding companies

Name of Surety

Name of Local Agent

Address

Address

City

City

State/Zip Code

State/Zip Code

Name

Agent's Name

Title

Agent's Title

Phone

Agents Phone

Surety's Acknowledgement

NOTICE: No substitution or revision to this bond form will be accepted. Sureties must be authorized to do business in and have an agent for services of process in the State of Nevada. Certified copy of Power of Attorney must be attached.

BID PROPOSAL

BID # 1415-019

BID TITLE: "Fleet Facility Expansion"

NOTICE: No substitution or revision to this Bid Proposal form will be accepted. Carson City will reject any Bid that is received that has changes or alterations to this document. Although the Prevailing Wages are provided in this bid document, the bidder is responsible to verify with the Labor Commissioner if any addendums have been issued. The successful bidder will be required to provide the current Prevailing Wages used in preparation of their bid within 24 hours of bid submission.

PRICES will be valid for sixty (60) calendar days after the bid opening which is indicated in the Notice to Contractors.

~~**A COPY OF CONTRACTOR'S "CERTIFICATE"** of eligibility issued by the State of Nevada Contractors' Board as proof of Bidder's compliance with the provisions of N.R.S. 338.147 must be submitted with his/her bid for the preference to be considered. This Statute does not apply to projects expected to cost less than \$250,000.~~

COMPLETION of this project is expected **PURSUANT TO THE BID DOCUMENTS.**

BIDDER acknowledges receipt of _____ Addendums.

SUMMARY

Description		Scheduled Value	Unit	Unit Price	Total Price
Base Bid Items - Schedule A:					
BP. 1	Mobilization, Demobilization and Clean-Up	1	LS		
BP. 2	Fleet Facility Expansion	1	LS		
Subtotal Schedule A:					
Additive Alternates – Schedule B:					
BP. 3	Alternate A - New Trench Drains in Existing Facility	1	LS		
BP. 4	Alternate B -Wash Bay and Concrete Aprons	1	LS		
BP. 5	Alternate C - Upper Level Finished to Two Offices and Interior Finishes	1	LS		
BP. 6	Alternate D - Concrete Aprons on the North and South Side of the New Fleet Facility Expansion at Grid Lines 1 Thru 4	1	LS		
BP. 7	Alternate E - Demolition of the Existing Interior Two-Story Office/Restroom Wood Structure in the Existing Fleet Maintenance Facility	1	LS		
BP. 8	Alternate F - Mechanical and Electrical Work in the Existing Building	1	LS		
Subtotal Schedule B:					
BP. 9	Total Base Bid Price (Schedule A + Schedule B)				

BP.10 Total Base (Schedule A + Schedule B) Bid Price Written in Words:



BID PROPOSAL

BP.11 BIDDER INFORMATION:

Company Name:

Federal ID No.:
Mailing Address:
City, State, Zip Code:
Complete Telephone Number:
Complete Fax Number:
Fax Number including area code:
E-mail:

Contact Person / Title:

Mailing Address:
City, State, Zip Code:
Complete Telephone Number:
Complete Fax Number:
E-mail Address:

BP.12 LICENSING INFORMATION:

Nevada State Contractor's License Number:
License Classification(s):
Limitation(s) of License:
Date Issued:
Date of Expiration:
Name of Licensee:
Carson City Business License Number:
Date Issued:
Date of Expiration:
Name of Licensee:

BID PROPOSAL

BP.13 DISCLOSURE OF PRINCIPALS:

Individual and/or Partnership:

Owner 1) Name:
Address:
City, State, Zip Code:
Telephone Number:
Owner 2) Name:
Address:
City, State, Zip Code:
Telephone Number:
Other 1) Title:
Name
Other 2) Title:
Name:

Corporation:

State in which Company is Incorporated:
Date Incorporated:
Name of Corporation:
Mailing Address
City, State, Zip Code:
Telephone Number:
President's Name:
Vice-President's Name:
Other 1) Name & Title:

BID PROPOSAL

BP.14 MANAGEMENT AND SUPERVISORY PERSONNEL:

Persons and Positions	Years With Firm
Name 1)	

Title 1)

Name 2)	
---------	--

Title 2)

Name 3)	
---------	--

Title 3)

Name 4)	
---------	--

Title 4)

Name 5)	
---------	--

Title 5)

Name 6)	
---------	--

Title 6)

(If additional space is needed, attach a separate page)

BID PROPOSAL

BP.15 REFERENCES:

Instructions:

List at least three (3) contracts of a similar nature performed by your firm in the last three (3) years. If **NONE**, use your Company's letterhead (and submit with your bid proposal) to list what your qualifications are for this contract. Carson City reserves the right to contact and verify, with any and all references listed, the quality of and the degree of satisfaction for such performance.

Clients: (if additional space is needed attach a separate page)

Company Name 1):
Contract Person:
Mailing Address:
City, State, Zip Code:
Complete Telephone Number:
E-Mail Address:
Project Title:
Amount of Contract:
Scope of Work:
Company Name 2):
Contract Person:
Mailing Address:
City, State, Zip Code:
Complete Telephone Number:
E-Mail Address:
Project Title:
Amount of Contract:
Scope of Work:

BID PROPOSAL

Company Name 3):
Contract Person:
Mailing Address:
City, State, Zip Code:
Complete Telephone Number:
E-Mail Address:
Project Title:
Amount of Contract
Scope of Work:
Company Name 4):
Contract Person:
Mailing Address:
City, State, Zip Code:
Complete Telephone Number:
E-Mail Address:
Project Title:
Amount of Contract:
Scope of Work:

BID PROPOSAL

BP. 16 CERTIFICATION REGARDING DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS PRIMARY COVERED TRANSACTIONS

1. The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:
 - a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded by any Federal, State or Local department or agency.
 - b) Have not within a three-year period preceding this bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or Local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property.
 - c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State or Local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and
 - d) Have not within a three-year period preceding this bid had one or more public transactions (Federal, State or Local) terminated for cause or default.
2. Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this bid.

Signature of Authorized Certifying Official

Title

Printed Name

Date

I am unable to certify to the above statement. My explanation is attached.

Signature

Date

BIDDER'S SAFETY INFORMATION

Bidder's Safety Factors:

Year	"E-Mod" Factor ¹	OSHA Incident Rate ²
2013		
2012		

¹ E-Mod (Experience Modification) Factors are issued by the Employer's Insurance Company of Nevada.

² OSHA Incident Rate is the number of OSHA Recordable Accidents per 100 employees and is calculated as the number of accidents divided by 208,000.

BID PROPOSAL

SUBCONTRACTORS

BP.17 INSTRUCTIONS: for Subcontractors and **General Contractors who self-perform** in amounts **exceeding five (5) percent of bid amount.** This information must be submitted with your bid proposal. The bidder shall enter **NONE** under **Name of Subcontractor** if not utilizing subcontractors exceeding this amount and **per NRS 338.141 the prime contractor shall list itself on the subcontractor's list if it will be providing any of the work on the project.** (This form must be complete in all respects. If, additional space is needed, attach a separate page).

Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of work		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of work		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of work		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of work		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of work		

BID PROPOSAL

SUBCONTRACTORS

BP.18 INSTRUCTIONS: for Subcontractors **exceeding one (1) percent of bid amount or \$50,000 whichever is greater.** This information must be submitted by the three lowest bidders within two (2) hours after the completion of the opening of the bids. The bidder may elect to submit this information with the bid proposal and, in that case, the bidder will be considered as having submitted this information within the above two hours.

Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of work		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of work		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of work		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of work		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of work		

BID PROPOSAL

SUBCONTRACTORS

BP. 19 INSTRUCTIONS: for all Subcontractors not previously listed on the 5% and 1% pages. This information must be submitted by the three lowest bidders within twenty four (24) hours after the completion of the opening of the bids. The bidder may elect to submit this information with the bid proposal and, in that case, the bidder will be considered as having submitted this information within the above twenty four hours.

Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of work		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of work		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of work		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of work		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of work		

BID PROPOSAL

BP. 20

WORKERS EMPLOYED REPORT INSTRUCTIONS FOR COMPLETION

Effective July 1, 2013, contractors who receive a preference in bidding on a public work must submit an affidavit to the public body certifying that 50 percent of all workers employed on the public work, including any employees of the contractor and of any subcontractor, will hold a valid driver's license or identification card issued by the Nevada Department of Motor Vehicles. Pursuant to NRS 338.070(4), a contractor and each subcontractor engaged on a public work shall keep an accurate record showing, for each worker employed by the contractor or subcontractor in connection with the public work who has a driver's license or identification card, the name of the worker, the driver's license number or identification card number of the worker, and the state or other jurisdiction that issued the license or card. A copy of this record must be received by the public body no later than 15 days after the end of the month. Additionally, the contractor and any subcontractor will maintain and make available for inspection within Nevada his or her records concerning payroll relating to the public work.

- EACH contractor and subcontractor must complete the Workers Employed Report.
- You may make additional copies of the report as necessary.
- A copy of this report must be submitted with the monthly certified payroll report.
- For the first report submitted, each contractor and subcontractor should list every worker employed in connection with the public work. The workers listed should be the same as those reported on the certified payroll report.
- For each subsequent month, add only those workers not previously reported to the Workers Employed Report and submit the newly-revised report. If no additional workers have been added, you may submit the previous month's report.
- If a worker has been reported on a previous month's report, but does not work during a subsequent month or is no longer employed by the contractor, his or her name should remain on the report. **DO NOT DELETE ANY NAMES.** This report is intended to serve as a cumulative list of all workers employed by the contractor and subcontractor over the duration of the project to verify compliance with the minimum requirements of the affidavit.

BID PROPOSAL

Local Preference Affidavit

(This form is required to receive a preference in bidding)

I, _____, on behalf of the Contractor, _____, swear and affirm that in order to be in compliance with NRS 338.XXX* and be eligible to receive a preference in bidding on Project No. _____, Project Name _____, certify that the following requirement will be adhered to, documented and attained on completion of the contract. Upon submission of this affidavit on behalf of _____, I recognize and accept that failure to comply with any requirements is a material breach of the contract and entitles the City to damages. In addition, the Contractor may lose their preference designation and/or lose their ability to bid on public works for one year, pursuant to NRS 338. XXX*:

1. The Contractor shall ensure that 50 percent of the workers employed on the job possess a Nevada driver's license or identification card;
2. The Contractor shall ensure all vehicles used primarily for the public work will be registered and (where applicable) partially apportioned to Nevada;
3. The Contractor shall ensure at least 50 percent of the design professionals who work on the project (including sub-contractors) have a Nevada driver's license or identification card.
4. The Contractor shall ensure payroll records related to this project are maintained and available within the State of Nevada.

***Note that specific sections of NRS 338 detailing the continued procedures associated with the use of the "bidder's preference" have been amended by the passage of Assembly Bill 172 effective 7/1/13, requiring this affidavit and subsequent record keeping and reporting by the General Contractor using the preference program and awarded this project. These requirements are not applicable to Contractors who do not use the "Bidder's Preference" eligibility certificate in their bid.**

By: _____ Title: _____

Signature: _____ Date: _____

Signed and sworn to (or affirmed) before me on this _____ day of _____, 20____,
by _____ (name of person making statement).

State of _____)
_____)ss.
County of _____)

Notary Signature STAMP AND SEAL

In compliance with the provisions of Chapters 338 of NRS and NAC, respectively, I, as an officer, owner or director of the undersigned contractor, hereby certify that this report is a true and accurate statement of worker s earnings employed on this Public Works contract by the undersigned contractor for the following payroll period:

BID PROPOSAL

Altered to include State of NV Regulations

Date _____

I, _____
 (Name of Signatory Party) (Title)

do hereby state:

(1) That I pay or supervise the payment of the persons employed by

_____ on the
 (Contractor or Subcontractor)

_____ ; that during the payroll period commencing on the
 (Building or Work)

_____ day of _____, _____, and ending the _____ day of _____, _____, all persons employed on said project have been paid the full weekly wages earned, that no rebates have been or will be made either directly or indirectly to or on behalf of said

_____ from the full
 (Contractor or Subcontractor)

weekly wages earned by any person and that no deductions have been made either directly or indirectly from the full wages earned by any person, other than permissible deductions as defined in Regulations, Part 3 (29 C.F.R. Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948, 63 Stat. 108, 72 Stat. 967; 76 Stat. 357; 40 U.S.C. § 3145), and described below:

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in any wage determination incorporated into the contract; that the classifications set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a State apprenticeship agency recognized by the Bureau of Apprenticeship and Training, United States Department of Labor, or if no such recognized agency exists in a State, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:

(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS

— in addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above referenced payroll, payments of fringe benefits as listed in the contract have been or will be made to appropriate programs for the benefit of such employees, except as noted in section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

— Each laborer or mechanic listed in the above referenced payroll has been paid, as indicated on the payroll, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the contract, except as noted in section 4(c) below.

(c) EXCEPTIONS

EXCEPTION (CRAFT)	EXPLANATION

REMARKS:

NAME AND TITLE	SIGNATURE
----------------	-----------

THE WILLFUL FALSIFICATION OF ANY OF THE ABOVE STATEMENTS MAY SUBJECT THE CONTRACTOR OR SUBCONTRACTOR TO CIVIL OR CRIMINAL PROSECUTION. SEE SECTION 1001 OF TITLE 18 AND SECTION 231 OF TITLE 31 OF THE UNITED STATES CODE.

NRS 338.070:
 4. The contractor and each subcontractor shall keep or cause to be kept an accurate record showing the name and the actual per diem, wages and benefits paid to each workman employed by him in connection with the public work. _____ to _____
 5. The record must be open at all reasonable hours to the inspection of the public body awarding the contract, and its officers and agents. The contractor or subcontractor shall ensure that a copy of the record for each calendar month is received by the public body awarding the contract no later than 15 days after the end of the month. The copy must be open to public inspection as provided in NRS 239.010. The record in the possession of the public body awarding the contract may be discarded by the public body 2 years after final payment is made by the public body for the public work.
 6. Any contractor or subcontractor, or agent or representative thereof, performing work for a public work who neglects to comply with the provisions of this section is guilty of a misdemeanor.

BID PROPOSAL

CARSON CITY BIDDER – DBE/MBE/WBE INFORMATION

CONTRACT NO. _____ CONTRACTOR _____

PROJECT NO. (S): _____ ADDRESS _____

BID AMOUNT \$ _____

This information must be submitted at the time of bid.

Name of DBE/MBE/WBE	Contract Item no.	Dollar Amount of Contract	% of Contract	Certification	Description of work or services to be contracted or supplies to be supplied

CONTRACTOR'S SIGNATURE

DATE

CONTRACT AWARD

CA.1 METHOD OF AWARD

The Bid, if awarded, will be awarded to the lowest responsive and responsible Bidder based on the Total Base Bid amount, plus or minus any or all Additive or Deductive Alternates, in any combination that is most advantageous to the City. Bidder must bid all items to be responsive and considered for award.

CA.2 TIME OF AWARD

The award, if made, will be within sixty (60) calendar days after the opening of Bids. The City reserves the right to accept or reject any or all Bids received.

CA.3 BONDS

A. Bonds Required

The Contractor agrees that any bonding or guarantee required by this bid shall not be considered as the exclusive remedy of the City for any default in any respect by the Contractor, but such bonding or guarantee shall be considered to be in addition to any right or remedy hereunder or allowed by law, equity, or statute.

A Performance Bond and a Payment Bond, pursuant to the requirements of NRS 339.025, if not otherwise excluded under the threshold stated in NRS 339.025, in the amount of one hundred percent (100%) of the Contract Amount shall be required of the Contractor prior to execution of the Contract and not later than ten (10) calendar days after receipt of the Notice of Award. Said bonds shall remain in full force and effect for a period of not less than one (1) year from the date of Final Acceptance of this Project by the City (Carson City Board of Supervisors or Carson City Regional Transportation Commission). Each of the bonds required must be executed by one or more surety companies authorized to do business in the State of Nevada. Note that individual surety bonds are not acceptable to the City.

B. Bond Forms

The referenced bonds shall be written on the Performance Bond, and Labor and Material Payment Bond forms provided by the City, as shown in the following Construction Contract forms.

The Bidder shall require any resident agent who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of his/her power of attorney.

Any Labor and Material Payment Bond or Performance Bond prepared by a licensed non-resident agent must be countersigned by a resident agent in accordance with the provisions of NRS 680A.300.

The referenced Bonds must be issued by a certified surety listed in the Department of the Treasury, Fiscal Service (Department Circular 570, Current Revision); companies holding certificates of authority as acceptable sureties on federal bonds and as acceptable reinsuring companies.

CA.4 INSURANCE REQUIREMENTS

A. General

Contractor, as an independent contractor and not an employee of the City, must carry policies of insurance in amounts specified and pay all taxes and fees incidental hereto. City shall have no liability except as specified in this Contract.

Contractor shall not commence work before: (1) Contractor has provided the required evidence of insurance to Carson City Purchasing and Contracts, (2) City has approved the insurance policies provided by Contractor, and (3) City has issued the Notice to Proceed.

Contractor shall not allow any subcontractors to commence work on its subcontract until all similar insurance required of the subcontractor has been obtained and verified by Contractor.

Prior approval of the insurance policies by City shall be a condition precedent to any payment of consideration under this Contract and City's approval of any changes to insurance coverage during the

CONTRACT AWARD

course of performance shall constitute an ongoing condition subsequent to this Contract. Any failure of City to timely approve shall not constitute a waiver of the condition.

The insurance requirements specified herein do not relieve Contractor of his/her responsibility or limit the amount of his/her liability to the City or other person, and Contractor is encouraged to purchase such additional insurance as he/she deems necessary.

Contractor is responsible for and must remedy all damage or loss to any property, including property of City, caused in whole or in part by Contractor, any subcontractor or anyone employed, directed or supervised by Contractor. Contractor is responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work.

City reserves the right to occupy existing facilities under construction or to use or occupy parts of the Work. Insurance policies shall not restrict or limit such use.

Certificate Holder: Each liability insurance policy shall list Carson City c/o Carson City Purchasing and Contracts, 201 North Carson Street, Suite 3, Carson City, Nevada 89701 as a certificate holder.

A. Insurance Coverage

Contractor shall, at Contractor's sole expense, procure, maintain and keep in force for the duration of this Contract the following insurance conforming to the minimum requirements specified below. Unless specifically specified herein or otherwise agreed to by the City, the required insurance shall be in effect prior to the commencement of work by the Contractor and shall continue in force as appropriate until the latter of:

1. Final acceptance by the City of the completion of this Contract; or
2. Such time as the insurance is no longer required by the City under the terms of this Contract
3. Any insurance or self-insured available to the City shall be in excess of and non-contributing with any insurance required from the Contractor. Contractor's insurance policies shall apply on a primary basis. Until such time as the insurance is no longer required by the City, Contractor shall provide the City with renewal or replacement evidence of insurance no less than thirty (30) calendar days before the expiration or replacement of the required insurance. If at any time during the period when insurance is required by this Contract, an insurer or surety fail to comply with the requirements of this Contract, as soon as **CONTRACTOR** has knowledge of any such failure, Contractor shall immediately notify the City and immediately replace such insurance or bond with an insurer meeting the requirements.

B. General Requirements

Certificate Holder: Each liability insurance policy shall list Carson City c/o Carson City Purchasing and Contracts, 201 North Carson Street, Suite 3, Carson City, Nevada 89701, as a certificate holder.

Additionally Insured: By Endorsement to the general liability insurance policy evidence by Contractor, the City and County of Carson City, Nevada, its officers, employees and immune Contractors shall be named as additionally insured's for all liability arising from this contract.

Waiver of Subrogation: Each liability insurance policy shall provide for a waiver of subrogation as to additionally insured's.

Cross Liability: All required liability policies shall provide cross-liability coverage as would be achieved under the standard ISO separation of insured's clause.

Deductibles and Self-Insured Retentions: Insurance maintained by the Contractor shall apply on a first dollar basis without application of a deductible or self-insured retention unless otherwise specifically

CONTRACT AWARD

agreed to by the City. Such approval shall not relieve Contractor from the obligation to pay any deductible or self-insured retention. Any deductible or self-insured retention shall not exceed \$5,000.00 per occurrence, unless otherwise approved by the City.

Policy Cancellation: Except for ten (10) calendar days notice for non-payment of premium, each insurance policy shall be endorsed to state that: without thirty (30) calendar days prior written notice to Carson City Purchasing and Contracts, the policy shall not be cancelled, non-renewed or coverage and/or limits reduced or materially altered, and shall provide that notices required by this paragraph shall be sent by certified mail to Carson City Purchasing and Contracts, 201 North Carson Street, Suite 3, Carson City, Nevada 89701.

Approved Insurer: Each insurance policy shall be issued by insurance companies authorized to do business in the State of Nevada or eligible surplus line insurers acceptable to the State and having agents in Nevada upon whom service of process may be made, and currently rated by A.M. Best as "A-VII" or better.

Evidence of Insurance: Prior to commencement of work, the Contractor must provide the following documents to Carson City Purchasing and Contracts, 201 North Carson Street, Suite 3, Carson City, Nevada 89701.

Certificate of Insurance: The Acord 25 Certificate of Insurance form or a form substantially similar must be submitted to Carson City Purchasing and Contracts to evidence the insurance policies and coverages required of Contractor.

Additional Insured Endorsement: An additional Insured Endorsement (CG20 10 or CG 20 26), signed by an authorized insurance company representative, must be submitted to Carson City Purchasing and Contracts to evidence the endorsement of **CITY** as an additional insured.

Schedule of Underlying Insurance Policies: If Umbrellas or Excess policy is evidenced to comply with the minimum limits, a copy of the Underlyer Schedule from the Umbrella or Excess insurance policy may be required.

Review and Approval: Documents specified above must be submitted for review and approval by Carson City Purchasing and Contracts prior to the commencement of work by Contractor. Neither approval by the City nor failure to disapprove the insurance furnished by the Contractor shall relieve Contractor or Contractor's full responsibility to provide the insurance required by this Contract. Compliance with the insurance requirements of this Contract shall not limit the liability of Contractor or its subcontractors, employees or agents to City or others, and shall be in addition to and not in lieu of any other remedy available to the City under this Contract or otherwise. Carson City reserves the right to request and review a copy of any required insurance policy or endorsement to assure compliance with these requirements.

C. Commercial General Liability Insurance

Minimum Limits required:

Two Million Dollars (\$2,000,000.00) – General Aggregate

Two Million Dollars (\$2,000,000.00) – Products and Completed Operations Aggregate

One Million Dollars (\$1,000,000.00) – Each Occurrence

Coverage shall be on an occurrence basis and shall be at least as broad as ISO 1996 form CG 00 01 (or a substitute form providing equivalent coverage); and shall cover liability arising from premises, operations, independent Contractors, completed operations, person injury, products, civil lawsuits, Title VII actions and liability assumed under an insured contract (including the tort liability or another assumed in a business contact).

CONTRACT AWARD

D. Business Automobile Liability

Minimum Limit required:

On Million Dollars (\$1,000,000.00) per occurrence for bodily injury and property damage

Coverage shall be for "any auto" including owned, non-owned and hired vehicles. The policy shall be written on ISO form CA 00 01 or a substitute providing equivalent liability coverage. If necessary, the policy shall be endorsed to provide contractual liability coverage.

F. Worker's Compensation and Employer's Liability Insurance

CONTRACTOR shall provide workers' compensation insurance as required by Nevada Revised Statutes Chapters 616A through 616D inclusive and Employer's Liability insurance with a minimum limit of \$500,000.00 each employee per accident for bodily injury by accident or disease.

CA.5 PENALTY FOR COLLUSION

If at any time, it is found that the Contractor has, in presenting any bid or bids, colluded with any other party or parties, then the Contract shall be null and void, and the Contractor and its sureties shall be liable for loss or damage which the City may suffer thereby, and the City may advertise for new bids for said Work. The Contractor further certifies that any and all prices which he/she may charge under the terms of the Contract do not, and will not; violate any existing Federal, State or Municipal laws or regulations concerning discrimination and/or price fixing.

CA.6 SUCCESSORS AND ASSIGNS

The performance of the Contract may not be assigned. Consent will not be given to any proposed assignment which would relieve the surety of the original Contractor of their responsibilities under the Contract, nor will the City consent to any assignment of a part of the Work under the Contract.

CA.7 RIGHTS AND REMEDIES

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

No action or failure to act by the City, the Design Consultant, or the Construction Manager shall constitute a waiver of any right or duty afforded any of them under the Contract, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

CA.8 COPELAND ANTI-KICKBACK LAW

The Contractor shall comply with the Copeland Anti-Kickback Act (19 U.S.C. 874) as supplemented in the Department of Labor Regulations (29 CFR Part 3). This act provides that each Contractor or subcontractor shall be prohibited from inducing by any means, any person employed in the construction, completion or repair of public work, to give up any part of the compensation to which he/she is otherwise entitled.

CA.9 NOTICE TO PROCEED

Within ten (10) calendar days of receipt of all required post-bid information, including bonds, insurances, and executed Contract, the City will issue the Notice to Proceed.

CA.10 TIME: COMPLETION OF PROJECT

A. Time

The successful Bidder, upon becoming the Contractor after having entered into a Contract with the City, shall commence the Work to be performed under the Contract on the date set by the City in the written Notice to Proceed, continuing the Work in accordance with the approved schedule and shall complete the entire Work within the number of calendar days stated in the Special Conditions after the date of the Notice to Proceed. Further, separable portions of the Work may be subject to milestone or specific dates as established in the Special Conditions.

CONTRACT AWARD

The time specified above represents no overtime requirement. Any scheduling of overtime for this Project is solely that of the Contractor, unless specifically directed in writing by the City. The City will not be responsible for any costs related to overtime work performed unless it is specifically directed in writing by the City.

B. Liquidated Damages

In case of failure on the part of the Contractor to complete the Work within the time(s) specified in the Contract, or within such additional time(s) as may be granted by formal action of the City, or the Contractor fails to prosecute the Work, or any separable part thereof, with such diligence as will insure its completion within the time(s) specified in the Contract or any extensions thereof, the Contractor shall pay to the City, as liquidated damages, the sum specified in the Special Conditions for each calendar day for delay until such reasonable time as may be required for final completion of the Work, together with any increased costs incurred by the City in completing the Work.

Time stated for completion shall include the final cleanup and demobilization.

The signing of the Bid Proposal by the Bidder shall be prima facie evidence that the Contractor agrees that the amount of liquidated damages is fair and reasonable.

CA. 11 LIQUIDATED DAMAGES FOR LATE SUBMITTALS AND LAPSE OF INSURANCE

The Contractor shall provide all submittals required by this Contract within fifteen (15) calendar days of the Notice to Proceed. If the Contractor does not provide the submittals on or before the fifteenth (15th) calendar day, he/she will pay to the City the amount of Two Hundred Fifty Dollars (\$250) per day as liquidated damages. If the Contractor does not keep the bonds or insurance policies in effect or allows them to lapse, the Contractor will pay to the City the amount of Two Hundred Fifty Dollars (\$250) per day as liquidated damages, and will be in breach of Contract.

END OF CONTRACT AWARD

SAMPLE CONTRACT

THIS **CONTRACT** made and entered into this 2nd day of October, 2014, by and between Carson City, a consolidated municipality, a political subdivision of the State of Nevada, hereinafter referred to as the "**OWNER**", and "???" hereinafter referred to as "**CONTRACTOR**".

WITNESSETH:

WHEREAS, the Purchasing and Contracts Administrator for the City and County of Carson City is authorized pursuant to Nevada Revised Statutes 338 and Carson City Purchasing Resolution #1990-R71, to approve and accept this Contract as set forth in and by the following provisions; and

WHEREAS, it is deemed necessary that the services of **CONTRACTOR** for **CONTRACT No. 1415-019, titled "Fleet Facility Expansion"** are both necessary and in the best interest of **CITY**; and

NOW, THEREFORE, in consideration of the aforesaid premises, the parties mutually agree as follows:

REQUIRED APPROVAL

This Contract shall not become effective until and unless approved by the Carson City Board of Supervisors or the Carson City Regional Transportation Commission.

CONTRACT TERM AND LIQUIDATED DAMAGES

CONTRACTOR agrees to complete the Work on or before the date specified in the Notice to Proceed or any executed Change Orders to the entire satisfaction of the **OWNER** before final payment is made, unless sooner termination by either party as specified in the General Conditions, section GC 3.18.

Pursuant to the provisions under Time for Completion and Liquidated Damages in the Contract Documents of said Specifications; the **CONTRACTOR** will complete the work within the Contract time. Since **OWNER** and **CONTRACTOR** agree it is difficult to ascertain the actual amount of damages incurred due to delay of the Project, it is agreed that **OWNER** will be paid the liquidated damages as specified in the Contract Special Conditions for each and every calendar day of delay in the completion of the work, in addition to any direct charges incurred by the **OWNER** as a result of delay of the Project, including engineering fees and additional damages due to late construction. The **OWNER** also reserves the right to deduct any amounts due the **OWNER** from any moneys earned by the **CONTRACTOR** under this Contract.

That in the performance of this Contract, an employer shall pay 1 ½ times an employee's regular wage rate whenever an employee who received compensation for employment at a rate less than 1 ½ time the minimum wage who works more than forty (40) hours in any scheduled work week, more than eight (8) hours in a day, unless by mutual agreement the employee works a scheduled ten (10) hours per day for four (4) calendar days with an work week. Employers should refer to NRS 608.018 for further details on overtime requirements.

NOTICE

Unless otherwise specified, termination shall not be effective until seven (7) calendar days after a party has served written notice of default, or without cause upon the other party. All notices or other communications required or permitted to be given under this Contract shall be in writing and shall be deemed to have been duly given if delivered personally in hand, by e-mail with simultaneous regular mail, by telephonic facsimile with simultaneous regular mail, or by certified mail, return receipt requested, postage prepaid on the date posted, and addressed to the other party at the address specified below.

For P&C Use Only
CCBL expires _____
NVCL expires _____
GL expires _____
AL expires _____
WC expires _____

SAMPLE CONTRACT

Notice to CONTRACTOR shall be addressed to:

Notice to CITY shall be addressed to:

Carson City Purchasing and Contracts
Kim Belt, CPM Purchasing and Contracts Manager
201 North Carson Street Suite 3
Carson City, NV 89701
775-283-7137 / FAX 775-887-2107
KBelt@carson.org

COMPENSATION

The parties agree that **CONTRACTOR** will provide the Work specified in these Contract Documents for the Contract Amount of "amount in word" (amount in figures).

OWNER will pay **CONTRACTOR** progress payments and the final payment computed from the actual quantities of work performed and accepted and the materials furnished at the Unit and Lump Sum prices shown on the **CONTRACTOR'S** Bid Proposal and any executed Change Orders.

Contract Amount represents full and adequate compensation for the complete Work, and includes the furnishing of all materials; all labor, equipment, tools, transportation, services, appliances; and all expenses, direct or indirect connected with the proper execution of the work.

OWNER does not agree to reimburse **CONTRACTOR** for expenses unless otherwise specified.

CONTRACT TERMINATION

Termination Without Cause:

Any discretionary or vested right of renewal notwithstanding, this Contract may be terminated upon written notice by mutual consent of both parties or unilaterally by either party without cause.

CITY reserves the right to terminate this Contract for convenience whenever it considers termination, in its sole and unfettered discretion, to be in the public interest. In the event that the Contract is terminated in this manner, payment will be made for work actually completed. In no event if termination occurs under this provision shall **CONTRACTOR** be entitled to anticipated profits on items of work not performed as of the effective date of the termination or compensation for any other item, including but not limited to, unabsorbed overhead. **CONTRACTOR** shall assure that all subcontracts which he/she enters related to this Contract likewise contain a termination for convenience clause which precludes the ability of any subcontractor to make claims against **CONTRACTOR** for damages, due to breach of contract, of lost profit on items of work not performed or of unabsorbed overhead, in the event of a convenience termination.

Termination for Nonappropriation:

All payments and services provided under this Contract are contingent upon the availability of the necessary public funding. In the event that Carson City does not appropriate the funding necessary to perform in accordance with the terms of the Contract, the Contract shall automatically terminate.

Cause Termination for Default or Breach:

A default or breach may be declared with or without termination.

SAMPLE CONTRACT

This Contract may be terminated by either party upon written notice of default or breach to the other party as follows:

If **CONTRACTOR** fails to provide or satisfactorily perform any of the conditions, work, deliverables, goods, or services called for by this Contract within the time requirements specified in this Contract or within any granted extension of those time requirements; or

If any state, county, city or federal license, authorization, waiver, permit, qualification or certification required by statute, ordinance, law, or regulation to be held by **CONTRACTOR** to provide the goods or services required by this Contract is for any reason denied, revoked, debarred, excluded, terminated, suspended, lapsed, or not renewed; or

If **CONTRACTOR** becomes insolvent, subject to receivership, or becomes voluntarily or involuntarily subject to the jurisdiction of the bankruptcy court; or

If **CITY** materially breaches any material duty under this Contract and any such breach impairs **CONTRACTOR'S** ability to perform; or

If it is found by **CITY** that any quid pro quo or gratuities in the form of money, services, entertainment, gifts, or otherwise were offered or given by **CONTRACTOR**, or any agent or representative of **CONTRACTOR**, to any officer or employee of **CITY** with a view toward securing a contract or securing favorable treatment with respect to awarding, extending, amending, or making any determination with respect to the performing of such contract; or

If it is found by **CITY** that **CONTRACTOR** has failed to disclose any material conflict of interest relative to the performance of this Contract.

CITY may terminate this Contract if **CONTRACTOR**:

Fails to maintain bonding, Nevada State Contractors' Board License, State Industrial Insurance requirements or insurance policies for limits as defined in this Contract;

Persistently or repeatedly refuses or fails to supply properly skilled workers or proper materials;

Fails to make payment to subcontractors for materials or labor in accordance with the respective agreements between **CONTRACTOR** and the subcontractors;

Persistently disregards laws, ordinances, or rules, regulations or order of a public authority having jurisdiction; Otherwise makes a material breach of a provision of this Contract; or

CONTRACTOR fails to maintain safe working conditions.

When any of the above reasons exist, **CITY** may provide, without prejudice to any other rights or remedies of **CITY** and after giving **CONTRACTOR** and **CONTRACTOR'S** Surety, seven (7) calendar days written notice, terminate employment of **CONTRACTOR** and may, subject to any prior rights of the surety:

Take possession of the site and of all materials, equipment, tools and construction equipment and machinery thereon owned by **CONTRACTOR**;

Accept assignment of subcontractors pursuant to this Contract (Contingent Assignment of Subcontracts to Carson City if this Contract is terminated); and,

Finish the Work by whatever reasonable method **CITY** may deem expedient.

If **CITY** terminates this Contract for one of the reasons stated above, **CONTRACTOR** shall not be entitled to receive further payment until the Work is finished.

If the unpaid balance of the Contract Amount exceeds the cost of finishing the Work including expenses made necessary thereby, such excess shall be paid to **CONTRACTOR**. If the costs of finishing the Work exceed the

SAMPLE CONTRACT

unpaid balance, **CONTRACTOR** shall pay the difference to **CITY**. The amount to be paid to **CONTRACTOR** or **CITY**, as the case may be, shall survive termination of this Contract.

In the event of such termination, all monies due **CONTRACTOR** or retained under the terms of this Contract shall be held by **CITY**; however, such holdings will not release **CONTRACTOR** or its sureties from liability for failure to fulfill this Contract. Any excess cost over and above the Contract Amount incurred by **CITY** arising from the termination of the operations of this Contract and the completion of the Work by **CITY** as provided above shall be paid for by any available funds held by **CITY**. **CONTRACTOR** will be so credited with any surplus remaining after all just claims for such completion have been paid.

If at any time before completion of the Work under this Contract, the Work shall be stopped by an injunction of a court of competent jurisdiction or by order of any competent authority, **CITY** may give notice to **CONTRACTOR** to discontinue the Work and terminate this Contract. **CONTRACTOR** shall discontinue the Work in such manner, sequence, and at such times as **CITY** may direct. **CONTRACTOR** shall have no claim for damages for such discontinuance or termination, nor any claim for anticipated profits on the Work thus dispensed with, nor for any claim for penalty, nor for any other claim such as unabsorbed overhead, except for the work actually performed up to the time of discontinuance, including any extra work ordered by **CITY** to be done.

Time to Correct:

Termination upon a declared default or breach may be exercised only after service of formal written notice as previously specified, and the subsequent failure of the defaulting party within five (5) calendar days of that notice to provide evidence, satisfactory to the aggrieved party, showing that the declared default or breach has been corrected.

Winding Up Affairs Upon Termination:

In the event of termination of this Contract for any reason, the parties agree that the provisions of this paragraph survive termination:

The parties shall account for and properly present to each other all claims for fees and expenses and pay those which are undisputed and otherwise not subject to set off under this Contract. Neither party may withhold performance of winding up provisions solely based on nonpayment of fees or expenses accrued up to the time of termination;

CONTRACTOR shall satisfactorily complete work in progress at the agreed rate (or a pro rata basis if necessary) if so requested by **CITY**;

CONTRACTOR shall execute any documents and take any actions necessary to effectuate an assignment of this Contract if so requested by **CITY**;

CONTRACTOR shall preserve, protect, and promptly deliver into **CITY** possession all proprietary information in accordance with City Ownership of Proprietary Information.

SCOPE OF WORK

The parties agree that the scope of work will be specifically described and hereinafter referred to as the **WORK**. This Contract incorporates the following attachments, a **CONTRACTOR'S** attachment shall not contradict or supersede any **OWNER** specifications and/or terms or conditions without written evidence of mutual assent to such change appearing in this Contract.

CONTRACTOR agrees that the Contract Documents for Bid No. 1415-019 include, but not limited to, the Notice to Contractors, Table of Contents, Project Coordination, Instructions to Bidders, Contract Award Information, General Conditions, Special Conditions, Technical Specification, Prevailing Wages, Contract Drawings, and Addenda, if any, herein after referred to as Exhibit A, are intended to be complete and complementary and are intended to describe a complete work. These documents are incorporated herein by reference and made a part whereof.

CONTRACTOR additionally agrees **CONTRACTOR'S** Bid Bond, Proposal Summary, Executed Contract, Performance Bond, Labor and Material Bond, Certificate of Eligibility, Insurance Certificates, Permits, Notice of

SAMPLE CONTRACT

Award, Notice to Proceed and Executed Change Orders, referred to as Exhibit B, are incorporated herein and made a part whereof.

DAVIS BACON & RELATED ACTS 29CFR PARTS 1,3,5,6,&7 AND NRS 338.070(6)

Each covered contractor or subcontractor must provide a weekly statement of the wages paid to each of its employees engaged in covered work. The statement shall be executed by the contractor or subcontractor or by an authorized officer or employee of the contractor or subcontractor who supervises the payment of wages and shall be on the "Statement of Compliance" form on the back of [WH-347 "Payroll \(For Contractors Optional Use\)"](#) or on any form with identical wording (Page BP-17). **Within seven days after the regular pay date for the pay period the statement shall be delivered to a representative of the federal or state agency in charge.**

NRS 338.070(6) requires: - "The record maintained pursuant to subsection 4-5 must be open at all reasonable hours to the inspection of the public body awarding the contract. The contractor engaged on the public work or subcontractor engaged on the public work shall ensure that a copy of the record for each calendar month is received by the public body awarding the contract no later than 15 days after the end of the month."

CERTIFIED PAYROLLS FOR DAVIS BACON AND PREVAILING WAGE PROJECTS

The higher of the Federal or local prevailing wage rates for Carson City, as established by the Nevada Labor Commission and the Davis-Bacon Act, shall be paid for all classifications of labor on this Project. Also, in accordance with NRS 338, the hourly and daily wage rates must be posted at the work site by the Contractor. The Contractor shall ensure that a copy of the Contractor's and Subcontractor's certified payrolls for each calendar week is received by Carson City.

The Contractor and each subcontractor shall keep an accurate payroll record, showing the name, address, work classification, straight time, and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed in connection with the Project.

The payroll records shall be certified and shall be submitted weekly to the Construction Manager. Submission of the certified payrolls shall be a condition precedent for processing the monthly progress payment. The General Contractor shall collect the wage reports from the Sub-Contractors and ensure the receipt of a certified copy of each weekly payroll for submission to the City as one complete package.

Pursuant to NRS 338.060 and 338.070, the Contractor hereby agrees to forfeit, as a penalty to the City, not less than Twenty Dollars (\$20) nor more than Fifty Dollars (\$50) for each calendar day or portion thereof that each worker employed on the Contract is paid less than the designated rate for any work done under the Contract, by the Contractor or any subcontractor under him/her, or is not reported to the City as required by NRS 338.070.

FAIR EMPLOYMENT PRACTICES

Pursuant to NRS 338.125, Fair Employment Practices, the following provisions must be included in any contract between **CONTRACTORS** and Public Bodies;

In connection with the performance of work under this Contract, the CONTRACTOR agrees not to discriminate against any employee or applicant for employment because of race, creed, color, national origin, sex sexual orientation or age, including, without limitation, with regard to employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including without limitation, apprenticeship.

In connection with the performance of work under this Contract, **CONTRACTOR** agrees not to discriminate against any employee or applicant for employment because of race, creed, color, national origin, sex, sexual orientation or age, including without limitation, with regard to employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including, without limitation, apprenticeship.

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CONTRACTOR further agrees to insert this provision in all subcontracts hereunder, except subcontracts for standard commercial supplies or raw materials.

PREFERENTIAL EMPLOYMENT

Pursuant to Nevada Revised Statute 338.130, in all cases where persons are employed in the construction of public works, preference must be given, the qualifications of the applicants being equal: (1) First: To persons who have been honorably discharged from the Army, Navy, Air Force, Marine Corps or Coast Guard of the United States, a reserve component thereof or the National Guard; and are citizens of the State of Nevada. (2) Second: To other citizens of the State of Nevada.

In connection with the performance of work under this Contract, **CONTRACTOR** agrees to comply with the provisions of Nevada Revised Statute 338.130 requiring certain preferences to be given to which persons are employed in the construction of a public work. If **CONTRACTOR** fails to comply with the provisions of Nevada Revised Statute 338.130, pursuant to the terms of Nevada Revised Statute 338.130(3), this Contract is void, and any failure or refusal to comply with any of the provisions of this section renders this Contract void.

ALTERNATIVE DISPUTE RESOLUTION

Pursuant to Nevada Revised Statute 338.150, public body charged with the drafting of specifications for a public work shall include in the specifications a clause requiring the use of a method of alternative dispute resolution before initiation of a judicial action if a dispute arising between the public body and the **CONTRACTOR** engaged on the public work if the dispute cannot otherwise be settled. Therefore, in the event that a dispute arising between **OWNER** and **CONTRACTOR** cannot otherwise be settled, **OWNER** and **CONTRACTOR** agree that, before judicial may be initiated, **OWNER** and **CONTRACTOR** will submit the dispute to non-binding mediation. **OWNER** shall present **CONTRACTOR** with a list of three potential mediators. **CONTRACTOR** shall select one person to serve as the mediator from the list of potential mediators presented by **OWNER**. The person selected as mediator shall determine the rules governing the mediation.

LIMITED LIABILITY

OWNER will not waive and intends to assert available NRS Chapter 41 liability limitations in all cases. Contract liability of both parties shall not be subject to punitive damages. Liquidated damages shall not apply unless otherwise specified in the incorporated attachments. Damages for any **OWNER** breach shall never exceed the amount of funds appropriated for payment under this Contract, but not yet paid to **CONTRACTOR**, for the fiscal year budget in existence at the time of the breach. **CONTRACTOR'S** tort liability shall not be limited.

FORCE MAJEURE

NEITHER party shall be deemed to be in violation of this Contract if it is prevented from performing any of its obligations hereunder due to strikes, failure of public transportation, civil or military authority, act of public enemy, accidents, fires, explosions, or acts of God, including, without limitation, earthquakes, floods, winds, or storms. In such an event, the intervening cause must not be through the fault of the party asserting such an excuse, and the excused party is obligated to promptly perform in accordance with the terms of this Contract after the intervening cause ceases.

INDEMNIFICATION

To the extent permitted by law, including but not limited to, the provisions of NRS Chapter 41, each party shall indemnify, hold harmless and defend, not excluding the other's right to participate, the other party from and against all liability, claims, actions, damages, losses, and expenses, including but not limited to reasonable attorney's fees and costs arising out of any alleged negligent or willful acts or omissions of the indemnifying party, its officers, employees and agents. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of the indemnity which would otherwise exist as to any party or person described in this paragraph.

Except as otherwise provided below, the indemnifying party shall not be obligated to provide a legal defense to the indemnifying party, nor reimburse the indemnified party for the same, for any period occurring

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before the indemnified party provides written notice of the pending claim(s) or cause(s) of action to the indemnifying party, along with:

- 1) a written request for a legal defense for such pending claim(s) or cause(s) of action; and
- 2) a detailed explanation of the basis upon which the indemnified party believed that the claim or cause of action asserted against the indemnified party implicated the culpable conduct of the indemnifying party, its officers, employees, and/or agents.

After the indemnifying party has begun to provide a legal defense for the indemnified party, the indemnifying party shall not be obligated to fund or reimburse any fees or costs provided by any additional counsel for the indemnified party, including counsel through which the indemnified party might voluntarily choose to participate in its defense of the same matter.

After the indemnifying party has begun to provide legal defense for the indemnified party, the indemnifying party shall not be obligated to reimburse the reasonable attorney's fees and costs incurred by the indemnified party during the initial thirty (30) day period of the claim or cause of action, if any, incurred by separate counsel.

INDEPENDENT CONTRACTOR

An independent contractor is a natural person, firm or corporation who agrees to perform services for a fixed price according to his/her or its own methods and without subjection to the supervision or control of the other contracting party, except as to the results of the work, and not as to the means by which the services are accomplished.

It is mutually agreed that **CONTRACTOR** is associated with **CITY** only for the purposes and to the extent specified in this Contract, and in respect to performance of the contracted services pursuant to this Contract. **CONTRACTOR** is and shall be an independent contractor and, subject only to the terms of this Contract, shall have the sole right to supervise, manage, operate, control, and direct performance of the details incident to its duties under this Contract.

Nothing contained in this Contract shall be deemed or construed to create a partnership or joint venture, to create relationships of an employer-employee or principal-agent, or to otherwise create any liability for **CITY** whatsoever with respect to the indebtedness, liabilities, and obligations of **CONTRACTOR** or any other party.

CONTRACTOR shall indemnify and hold **CITY** harmless from, and defend **CITY** against, any and all losses, damages, claims, costs, penalties, liabilities, expenses arising out of or incurred in any way because of, but not limited to, **CONTRACTOR**'S obligations or legal duties regarding any taxes, fees, assessments, benefits, entitlements, notice of benefits, employee's eligibility to work, to any third party, subcontractor, employee, state, local or federal governmental entity.

Neither **CONTRACTOR** nor its employees, agents, or representatives shall be considered employees, agents, or representatives of **CITY**.

COMPLIANCE WITH LEGAL OBLIGATIONS

Pursuant to NRS 338.153, a public body shall include in each contract for a public work a clause requiring each Contractor, subcontractor and other person who provide labor, equipment, materials, supplies and services for the public work to comply with the requirements of all applicable state and local laws, including without limitation, any applicable licensing requirements and requirements for the payment of sales and use taxes on equipment, materials and supplies provided for the public work.

CONTRACTOR shall procure and maintain for the duration of this Contract any state, county, city, or federal license, authorization, waiver, permit, qualification or certification required by statute, ordinance, law, or regulation to be held by **CONTRACTOR** to provide the goods or services of this Contract. **CONTRACTOR** will be responsible to pay all government obligations, including, but not limited to, all taxes, assessments, fees, fines, judgments, premiums, permits, and licenses required or imposed by law or a court. Real property and personal

SAMPLE CONTRACT

property taxes are the responsibility of **CONTRACTOR** in accordance with Nevada Revised Statutes 361.157 and 361.159. **CONTRACTOR** agrees to be responsible for payment of any such government obligations not paid by its subcontractors during performance of this Contract. CITY may set-off against consideration due any delinquent government obligation.

WAIVER OF BREACH

Failure to declare a breach or the actual waiver of any particular breach of this Contract or its material or nonmaterial terms by either party shall not operate as a waiver by such party of any of its rights or remedies as to any other breach.

SEVERABILITY

If any provision contained in this Contract is held to be unenforceable by a court of law or equity, this Contract shall be construed as if such provision does not exist and the nonenforceability of such provision shall not be held to render any other provision or provisions of this Contract unenforceable.

ASSIGNMENT/DELEGATION

To the extent that any assignment of any right under this Contract changes the duty of either party, increases the burden or risk involved, impairs the chances of obtaining the performance of this Contract, attempts to operate as a novation, or includes a waiver or abrogation of any defense to payment by **OWNER**, such offending portion of the assignment shall be void, and shall be a breach of this Contract. **CONTRACTOR** shall neither assign, transfer nor delegate any rights, obligations or duties under this Contract without the prior written approval of **OWNER**.

CITY OWNERSHIP OF PROPRIETARY INFORMATION

Any files, reports, histories, studies, test, manuals, instruction, photographs, negatives, blue prints, plans, maps, data, system designs, computer programs, computer codes, and computer records (which are intended to be consideration under this Contract), or any other documents or drawings, prepared or in the course of preparation by **CONTRACTOR** (or its subcontractors) in performance of its obligations under this Contract shall be exclusive property of the City of Carson City, Nevada, and such materials shall be delivered into **OWNER'S** possession by **CONTRACTOR** upon completion, termination, or cancellation of this Contract. **CONTRACTOR** shall not use, willingly allow, or cause to have such materials used for any purpose other than the performance of **CONTRACTOR'S** obligations under this Contract without the prior written consent of **OWNER**. Notwithstanding the foregoing, **OWNER** shall have no proprietary interest in any materials license for use by **OWNER** that are subject to patent, trademark or copyright protection.

OWNER shall be permitted to retain copies, including reproducible copies, of **CONTRACTOR'S** drawings, specifications, and other documents for information and reference in connection with this Contract.

CONTRACTOR'S drawings, specification and other documents shall not be used by **OWNER** or others without expressed permission of **CONTRACTOR**.

PUBLIC RECORDS

Pursuant to NRS 239.010, information or documents received from **CONTRACTOR** may be opened to public inspection and copying. **OWNER** will have duty to disclose unless a particular record is made confidential by law or a common law balancing of interests. **CONTRACTOR** may clearly label specific parts of an individual document as a "trade secret" or "confidential" in accordance with NRS 332,061, provided that **CONTRACTOR** thereby agrees to indemnify and defend **OWNER** for honoring such a designation. The failure to so label any document that is released by **OWNER** shall constitute a complete waiver of any and all claims for damages caused by any release of the records.

SAMPLE CONTRACT

CONFIDENTIALITY

CONTRACTOR shall keep confidential all information, in whatever form, produced, prepared, observed or received by **CONTRACTOR** to the extent that such information is confidential by law or otherwise required by this Contract.

FEDERAL FUNDING

In the event federal funds are used for payment of all or part of this Contract:

CONTRACTOR certified, by signing this Contract, that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any federal department or agency. This certification is made pursuant to the regulations implementing Executive Order 12549, Debarment and Suspension, 28 C.F.R. pt. 67, § 67.510, as published as pt. VII of the May 26, 1988, Federal Register (pp.19160-19211), and any relevant program-specific regulations. This provision shall be required of every subcontractor receiving any payment in whole or in part from federal funds.

CONTRACTOR and its subcontractors shall comply with all terms, conditions, and requirements of the Americans with Disabilities Act of 1990 (P.L. 101-136), 42 U.S.C. 12101, as amended, and regulations adopted thereunder contained in 28 C.F.R. 26.101.36.999, inclusive, and any relevant program-specific regulations.

CONTRACTOR and its subcontractors shall comply with the requirements of the Civil Rights Act of 1964, as amended, the Rehabilitation Act of 1973, P.L. 93-112, as amended, and any relevant program-specific regulation, and shall not discriminate against any employee or offeror for employment because of race, national origin, creed, color, sex, religion, age, disability or handicap conditions (including AIDS and AIDS-related conditions).

LOBBYING

The parties agree, whether expressly prohibited by federal law, or otherwise, that no funding associated with this Contract will be used for any purpose associated with or related to lobbying or influencing or attempting to lobby or influence for any purpose the following:

Any federal, state, county or local agency, legislature, commission, counsel or board;

Any federal, state, county or local legislator, commission member, counsel member, board member, or any other elected official; or

Any officer or employee of any federal, state, county or local agency, legislature, commission, counsel, or board.

PROPER AUTHORITY

The parties hereto represent and warrant that the person executing this Contract on behalf of each party has full power and authority to enter into this Contract. **CONTRACTOR** acknowledges that this Contract is effective only after approval by the Carson City Board of Supervisors and only for the period of time specified in this Contract. Any services performed by **CONTRACTOR** before this Contract is effective or after it ceases to be effective are performed at the sole risk of **CONTRACTOR**.

GOVERNING LAW: JURISDICTION

This Contract and the rights and obligations of the parties hereto shall be governed by, and construed according to, the laws of the State of Nevada, without giving effect to any principal of conflict-of-law that would require the application of the law of any other jurisdiction. **CONTRACTOR** consents and agrees to the jurisdiction of the courts of the State of Nevada located in Carson City, Nevada for enforcement of this Contract.

SAMPLE CONTRACT

ENTIRE CONTRACT AND MODIFICATION

This Contract and its integrated attachment(s) constitute the entire contract of the parties and such are intended as a complete and exclusive statement of the promises, representations, negotiations, discussions, and other Contracts that may have been made in connection with the subject matter hereof. Unless an integrated attachment to this Contract specifically displays a mutual intent to amend a particular part of this Contract general conflicts in language between any such attachment and this Contract shall be construed consistent with the terms of this Contract. Unless otherwise expressly authorized by the terms of this Contract, no modification or amendment to this Contract shall be binding upon the parties unless the same is in writing and signed by the respective parties hereto and approved by the Carson City Board of Supervisors. The parties agree that each has had their respective counsel review this Contract which shall be construed as if it was jointly drafted.

SAMPLE CONTRACT

AND ALL SUPPLEMENTAL AGREEMENTS AMENDING OR EXTENDING THE WORK CONTEMPLATED.

ACKNOWLEDGMENT AND EXECUTION:

In witness whereof, the parties hereto have caused this Contract to be signed and intend to be legally bound thereby.

CARSON CITY
Finance Director

Attn: Kim Belt, CPM - Purchasing and Contracts Manager
201 North Carson Street, Suite 3
Carson City, Nevada 89701
Telephone: 775-283-7137
Fax: 775-887-2107
KBelt@carson.org

By: _____
Kim Belt, CPM

Dated _____

CITY'S LEGAL COUNSEL
Neil A. Rombardo, District Attorney

I have reviewed this Contract and approve
as to its legal form.

By: _____
Deputy District Attorney

Dated _____

CITY'S ORIGINATING DEPARTMENT
BY: Darren Schulz, Director
Carson City Public Works Department
3505 Butti Way
Carson City, Nevada 89701
Telephone: 775-887-2355
Fax: 775-887-2164
DSchulz@carson.org

By: _____

Dated _____

SAMPLE CONTRACT

"name of signer" deposes and says: That he/she is Contractor or authorized agent of Contractor; the he/she has read the foregoing Contractor; and that he/she understands the terms, conditions and requirements thereof.

CONTRACTOR

BY:

TITLE:

FIRM:

CARSON CITY BUSINESS LICENSE #:

NEVADA CONTRACTOR'S LICENSE #:

Address:

City: State: Zip Code:

Telephone: /Fax:

E-mail Address:

(Signature of Contractor)

DATED _____

STATE OF _____)

)ss

County of _____)

Signed and sworn (or affirmed before me on this _____ day of _____, 2014, by "name of Contractor".

(Signature of Notary)

(Notary Stamp)

SAMPLE CONTRACT

CONTRACT ACCEPTANCE AND EXECUTION:

The Board of Supervisors for Carson City, Nevada at their publicly noticed meeting of October 2, 2014 approved the acceptance of the attached contract hereinbefore identified as **CONTRACT No. 1415-019** and titled "**Fleet Facility Expansion**". Further, the Board of Supervisors authorizes the Mayor of Carson City, Nevada to set his hand to this document and record his signature for the execution of this contract in accordance with the action taken.

CARSON CITY, NEVADA

ROBERT L CROWELL, MAYOR

DATED this 2nd day of October, 2014.

ATTEST:

ALAN GLOVER, CLERK-RECORDER

DATED this 2nd day of October, 2014

PERFORMANCE BOND

Doc. No. 2151
(Rev. 11-17-99)

KNOW ALL MEN BY THESE PRESENTS, that I/we _____
_____ as Principal, hereinafter called Contractor, and

_____ a corporation duly organized under the laws of the State of Nevada, as Surety, hereinafter called the Surety, are held and firmly bound unto Carson City, Nevada a consolidated municipality of the State of Nevada, hereinafter called City, for the sum of \$ _____ Dollars (state sum in Words) _____

_____ for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Contractor has by written agreement dated _____, 2014, entered into a contract with the City for **BID # 1415-019** and titled "**Fleet Facility Expansion**" in accordance with drawings and specifications prepared by Carson City and which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if Contractor shall promptly and faithfully perform said Contract then this obligation shall be null and void; otherwise it shall remain in full force and effect. The Surety hereby waives notice of any alteration or extension of time made by the City and its obligation is not affected by any such alteration or extension provided the same is within the scope of the contract. Whenever Contractor shall be, and is declared by City to be in default under the Contract, the City having performed City's obligations thereunder, the Surety may promptly remedy the default or shall promptly:

- 1) Complete the Contract in accordance with its terms and conditions; or
- 2) Obtain a bid or bids for completing the Contract in accordance with its terms and conditions, and upon determination by the City and the Surety jointly of the lowest responsive, responsible bidder, arrange for a contract between such bidder and the City, and make available as work progresses (even though there should be a default or a succession of defaults under the contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the contract price, but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term "balance of the contract price", as used in this paragraph, shall mean the total amount payable by City to Contractor under the Contract and any amendments thereto, less the amount properly paid by City to Contractor. No right of action shall accrue on this bond to or for the use of any person or corporation other than the City or successors of the City.

PERFORMANCE BOND

Continued for **BID # 1415-019** and titled "Fleet Facility Expansion"

BY:	(Signature of Principal)
TITLE:	
FIRM:	
Address:	L.S.
City, State, Zip	
Phone:	
Printed Name of Principal	
Attest By	(Signature of Notary)
Subscribed and Sworn before me this	,2014
day of	

CLAIMS UNDER THIS BOND MAY BE ADDRESSED TO:	Nevada Resident Agent Information (complete for out of state bonding companies)
Name of Surety	Name of Local Agent
Address	Address
City	City
State/Zip Code	State/Zip Code
Name	Agent's Name
Title	Agent's Title
Telephone	Agent's Telephone
Surety's Acknowledgment:	Nevada Resident Agent's Acknowledgment:
By:	By:

NOTICE:

No substitution or revision to this bond form will be accepted. Sureties must be authorized to do business in and have an agent for service of process in the State of Nevada. Certified copy of Power of Attorney must be attached.

LABOR AND MATERIAL PAYMENT BOND

Doc. No. 2152
(Rev. 11-17-99)

KNOW ALL MEN BY THESE PRESENTS, that I/we _____
_____ as Principal, hereinafter called Contractor, and
_____ a
corporation duly organized under the laws of the State of Nevada, as Surety, hereinafter called the Surety, are
held and firmly bound unto Carson City, Nevada a consolidated municipality of the State of Nevada, hereinafter
called City, for the \$ _____ Dollars (state sum in words) _____
_____ f
or the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors
and assigns, jointly and severally, firmly by these presents.

WHEREAS, Contractor has by written agreement dated _____, 2014 entered into a
contract with the City for **BID # 1415-019** and titled "**Fleet Facility Expansion**" in accordance with drawings and
specifications prepared by Carson City and which contract is by reference made a part hereof, and is hereinafter
referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if Contractor
shall promptly make payment to all claimants as hereinafter defined, for all labor and material used or reasonably
required for use in the performance of the Contract, then this obligation shall be void; otherwise it shall remain in
full force and effect, subject, however, to the following conditions:

- 1) A claimant is defined as one having a direct contract with the Contractor or with a Subcontractor of the Principal for labor, material, or both, used or reasonably required for use in the performance of the Contract, labor and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental of equipment directly applicable to the Contract.
- 2) The above-named Principal and Surety hereby jointly and severally agree with the City that every claimant as herein defined, who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such claimant's work or labor was done or performed, or materials were furnished by such claimant, may sue on this bond for the use of such claimant, prosecute the suit to final judgment for such sum or sums as may be justly due claimant, and have execution thereon. The City shall not be liable for the payment of any costs or expenses of any such suit.
- 3) No suit or action shall be commenced hereunder by any claimant:
 - a) Unless claimant, other than one having a direct contract with the Contractor, shall have given written notice to any two of the following: the Contractor, the City, or the Surety above named, within ninety (90) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be personally served or served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the Principal at any place the Principal maintains an office or conducts its business.
 - b) After the expiration of one (1) year following the date on which the last of the labor was performed or material was supplied by the party bringing suit.
 - c) Other than in a court of competent jurisdiction for the county or district in which the construction contract was to be performed.

LABOR AND MATERIAL PAYMENT BOND

Continued for **BID #1415-019** and titled "**Fleet Facility Expansion**"

- 4) The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics' liens which may be filed of record against said improvement, whether or not claim for the amount of such lien be presented under and against this bond.

BY:	(signature of Principal)
TITLE:	
FIRM:	
Address:	L.S.
City, State, Zip	
Phone:	
Printed Name of Principal:	
Attest by:	(signature of notary)
Subscribed and Sworn before me this	, 2014
day of	

CLAIMS UNDER THIS BOND MAY BE ADDRESSED TO:	Nevada Resident Agent Information (complete for out of state bonding companies)
Name of Surety	Name of Local Agent
Address	Address
City	City
State/Zip Code	State/Zip Code
Name	Agent's Name
Title	Agent's Title
Telephone	Agent's Telephone
Surety's Acknowledgment:	Nevada Resident Agent's Acknowledgment:
By:	By:

NOTICE:

No substitution or revision to this bond form will be accepted. Sureties must be authorized to do business in and have an agent for service of process in the State of Nevada. Certified copy of Power of Attorney must be attached.

GENERAL CONDITIONS

SECTION 1.0 INTENT, DEFINITIONS, ABBREVIATIONS

GC 1.1 INTENT OF CONTRACT DOCUMENTS

The intent of the Contract Drawings and Specifications is to describe the details for the construction and completion of the Work which the Contractor undertakes to perform in accordance with the terms of the Contract. Contract Drawings and Specifications are divided into groups for the convenience of the City Engineer, and Construction Manager. These divisions are not for apportioning Work or responsibility for Work among subcontractors, suppliers, and manufacturers. The Contractor shall provide the City with a complete and operable Work or improvement, even though the Contract Drawing and Specifications may not specifically call out all items or items of work required of the Contractor to complete his/her tasks, incidental appurtenances, materials and the like and without additional compensation.

Where the Contract Drawings or Specifications describe portions of the Work in general terms but not in complete detail, it is understood that only the best general practice is to prevail and that only materials and workmanship of the best quality are to be used. The Contractor shall furnish tools, equipment, and incidentals, and do all the Work involved in executing the Contract in a satisfactory and complete manner.

The Instructions to Bidders, General Conditions, Special Conditions, Technical Specifications, Standard Specifications, Drawings and all supplementary documents are intended to be complete and complementary and to prescribe a complete work. If any omissions are made of information necessary to carry out the full intent and meaning of the Contract Documents, the Contractor shall immediately call the matter to the attention of the Engineer for furnishing of detail instructions. If specific lines, grades, and dimensions are not shown on the Drawings, those furnished by the Engineer shall govern.

Anything mentioned in these Specifications and not indicated on the Contract Drawing, or anything indicated on the Contract Drawing and not mentioned in these Specifications, shall be in the same force and effect as if indicated or mentioned in both.

In the event the materials and/or equipment are to be furnished by the City, as designated in the Special Conditions, this shall not relieve the Contractor of the above requirements to furnish all other labor, materials, and equipment to complete the Contract.

GC 1.2 PARTIAL INVALIDITY

If any provision of this Contract is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remaining provisions shall nevertheless continue in full force without being impaired or invalidated in any way.

GC 1.3 GOVERNING ORDER OF BIDDING AND CONTRACT DOCUMENTS

The Bidding and Contract Documents include various divisions, sections, and conditions which are essential parts for the Work to be provided by the successful Bidder. A requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete Work. In case of discrepancy, the following precedence will govern:

- a. Permits from City Departments and other Agencies as may be required by law
- b. Change Orders
- c. Contract
- d. Addenda
- e. Special Conditions
- f. Technical Specifications
- g. General Conditions
- h. Contract Drawing s
- i. Standard Specifications for Public Works Construction (Orange Book specifications) sponsored and distributed by R.T.C. of Washoe County, Washoe County, City of Sparks, City of Reno, Carson City, and City of Yerington; 1996 Edition with Revision No. 1 dated 12-15-1998, Revision No. 2 dated 5-1-2000, Revision No. 3 dated 11-08-2001, Revision No. 4 dated 2-27-2004, and Revision No. 5 dated 2-14-2007.
- j. Reference Specifications

GENERAL CONDITIONS

With reference to Contract Drawing, the order of precedence is as follows:

- 1) Addenda/Change Order Drawings govern over any other Drawing
- 2) Figures govern over scaled dimensions
- 3) Contract Detail Drawings govern over Contract General Drawings
- 4) Contract Drawing govern over Standard Details

GC 1.4 HEADINGS

Headings to parts, divisions, sections, articles, paragraphs, subparagraphs, and forms are inserted for convenience of reference only and shall not affect the interpretation of the Contract Documents.

GC 1.5 DEFINITIONS

The words directed, required, permitted, ordered, instructed, designated, applicable, appropriate, sufficient, proper, desirable, necessary, prescribed, approved, acceptable, satisfactory or words of like import refer to actions, expressions, and prerogatives of the City, Design Consultant, or Construction Manager.

Each gender work includes the masculine, feminine and neuter genders. References to gender, such as "workman" and "flagman" and the pronouns "he" or "his" referring to such titles, are abstract in the specifications, are used for the sake of brevity, and are intended to refer to persons of either sex and, if applicable, to the neuter gender.

Singular words include the plural and "person" includes firms, companies, and corporations.

Where used in the Contract Documents, the following words and terms shall have the meanings indicated. The meanings shall be applicable to the singular, plural, masculine, and feminine of the words and terms.

Acceptance - The formal action by the Carson City Board of Supervisors or the Carson City Regional Transportation Commissions accepting the work as being complete. See Final Acceptance.

Act of God - An earthquake, flood, cyclone, or other cataclysmic phenomenon of nature. A rain, windstorm, high water, or other natural phenomenon which might reasonably have been anticipated from historical records of the general locality of the Work, shall not be construed as an Act of God.

Addenda - Written or graphic instruments issued prior to the Bid Opening which modify or interpret the Contract Documents, Drawings, and specifications by additions, deletions, clarifications, or corrections. All addenda become part of the Contract Documents.

Additive Alternative Bid - The amount stated in the Bid Schedule - Additive Schedule to be added to the amount of the Base Bid if the corresponding change in the Work, as described in the Bid Documents, is accepted by the City with the Award of the Project, subject to the availability of funds. Bidder must quote all items to be responsive and considered for Award.

Agreement - The written Contract covering the performance of the Work as more fully described in the Contract Documents.

As Shown, As Indicated, As Detailed - Where these words or words of similar import are used, it shall be understood that reference to the Drawings is made unless stated otherwise.

As Directed, As Permitted, As Approved - Where these words or words of similar import are used, it shall be understood that written direction, requirements, permission, approval or acceptance of the Construction Manager is intended unless otherwise stated.

Bid - The offer or proposal of the Bidder submitted on the prescribed forms setting forth the price for the Work to be performed.

GENERAL CONDITIONS

Bidder - Any properly licensed and qualified individual, firm, partnership, corporation, joint venture, or combination thereof, submitting a proposal for the Work contemplated, acting directly or through a duly authorized representative.

Bond(s) - Bid, Performance, or Payment Bonds and Guarantee and other instruments of surety, furnished by the Contractor and Contractor's surety in accordance with the Contract Documents.

Calendar Day - Every day shown on the calendar.

Cardinal Change - A change required by the City which requires the Contractor to build a fundamentally different Project than originally planned.

City - Consolidated City/County of Carson City, Nevada. Under this Contract, the City is usually identified by name.

Change Order - A written order to the Contractor authorizing an addition, deletion, or revision of the work within the general scope of the Contract, or an adjustment in the contract price or time. Also referred to as a Contract Change Order.

Construction Completion or Completion of Work - Construction completion is when all work is complete, including punch list items, final cleanup, demobilization and submittal of final documentation, in accordance with the contract documents.

Construction Conflicts - Conflicts which may occur whenever corrections, alterations, or modifications of the Work under this Contract are ordered and approved by the City and change the character of the Work, the amount of the Work or the period of time in which to complete said Work.

Construction Inspector - The person designated by the City to act as its representative at the construction site, or remote locations, to perform construction inspection services.

Construction Manager - The person designated in writing by the City to act as its representative at the construction site and to perform construction inspection services and administrative functions relating to this Contract. Initial contact by the Contractor with the City shall be through the Construction Manager.

Construction Schedule - A graphic document that is computer generated which utilizes "critical path method" or "bar chart method" for scheduling projects. The construction schedule is supported by reports that can be generated to demonstrate relationships and logic.

Contract - The written agreement between Carson City and the Contractor setting forth the obligations of the parties thereunder, including, but not limited to the performance of the work, the furnishing of labor and materials, and the basis of payment.

Contract Completion Date - The date set forth in the Contract documents for the completion of all Contract work, including all punch list work, final cleanup and demobilization.

Contract Documents - The words "Contract Documents" shall mean any or all of, but not limited to, the following items, as applicable: Notice to Contractors, Instructions to Bidders, Bid Bond, Bid Proposal Summary, Contract Award Instructions, Contract, Performance Bond, Labor and Material Payment Bond, General Conditions, Prevailing Wage Rates, Permits, Special Conditions, Standard Specifications, Technical Specifications, Drawings, Addenda, if any, Executed Change Orders, if any, Notice of Award, and Notice to Proceed

Each of these items is to be considered by reference as part of the Contract Documents. Also referred to as the Contract.

GENERAL CONDITIONS

Contract Price - The total amount payable to the Contractor under the terms and conditions of the Contract based on the price given on the Bid Proposal, with adjustments made in accordance with the Contract. Said total amount shall include all sales, use, and other consumer taxes related to the work. The base amount given in the Bid Proposal shall be either a lump sum Bid or the summation of the unit price Bids multiplied by the estimated quantities set forth in the Bid form. Also referred to as the Contract Amount.

Contract Time - Number of calendar days stated in the Contract Documents for the completion of the Work, including all authorized time adjustments.

Contractor - The person or persons, firms, partnership, corporation, joint venture, or combination thereof, who have entered into the Contract with the City. "Contractor" shall mean the principal Contractor as defined by NRS 624.020 or his/her authorized representative.

Contractor's Plant and Equipment - Equipment, material, supplies, tools and all other items, except labor, brought onto the site by the Contractor to carry out the Work, but not to be incorporated in the Work.

Day(s) - See Calendar Day(s). A twenty-four hour time period beginning at 12 midnight of day one and terminating at 12 midnight of the same day.

Design Consultant - The engineer, architect or other licensed professional designated by the City to have design control over the Work or a specified portion of the Work, acting either directly or through duly authorized representatives. Such representatives shall act within the scope of the particular duties delegated to them.

Drawings - Refers to the Contract Drawing, profiles, cross sections, elevations, details, and other working Drawings and supplementary Drawings, or reproductions thereof, signed by the Design Consultant and bearing the appropriate Professional seal, approved by the City, and are referred to in the Contract Documents. Drawings show the location, character, dimensions, and details of the Work to be performed. The term "plans" has the same meaning as the term Drawings.

Engineer- The City Engineer of Carson City, or other person or firm designated by the City Engineer as his/her duly authorized representative.

Extra Work - An item of work not provided for in the Contract as awarded but found essential by the Engineer to the satisfactory completion of the Contract within its intended scope.

Field Directive - Written documentation of the actions of the City or Construction Manager in directing the Contractor. Also referred to as a Work Directive.

Field Order - A written instruction given to the Contractor by the City or Construction Manager, authorizing Work that is a change to the scope of Work, to be carried out on a time and materials basis, or a negotiated lump sum. Also referred to as a Work Directive.

Final Acceptance - The formal acceptance by the City of the Work for an entire Contract, which has been completed in all respects (including submittal of the operation and maintenance manuals, equipment start-up and testing, warranty of title, and submittal of record drawings, lien and claims releases, and warranty), in accordance with the Contract Documents and any modifications thereof previously approved.

Final Completion - Final completion is when construction is complete, the City has accepted the work, and the Notice of Completion has been recorded in the Office of the County Recorder. This is based on acceptance by the Carson City Board of Supervisors or the Carson City Regional Transportation Commission of the completed work embraced by the Contract.

GENERAL CONDITIONS

Float - Float or "total float" shall be defined as provided in the Associated General Contractors of America "CPM in Construction, A Manual for General Contractors".

General Conditions - Part of the Contract Documents representing the general clauses that establishes how the Contract is to be administered.

Holidays - Legal holidays observed by the City.

Inspector- The authorized representative of the Engineer assigned to observe the work or materials therefor.

Intermediate Completion- Intermediate Completion is the stage in the progress of the work when an element, section, or division of the Work is sufficiently complete in accordance with the contract documents so that the City can occupy or utilize the essential component(s) of the contractually defined element, section or division of the Work for its intended purpose.

Laboratory - The designated materials testing laboratory authorized by the City to test materials and Work involved in the Contract.

Liquidated Damages - Money to be paid to the City or to be deducted from any payments due to the Contractor for each day's delay in completing the whole, any specified portion of the Work beyond the time allowed in the Contract Documents, submitting award documentation, or technical submittals.

Major Bid Item - Any bid item whose unit bid item price extension is 5 percent or more of the total Contract Price.

Notice of Award - A written notice by the City to the Contractor informing it that the Contract has been awarded to the Contractor.

Notice of Completion - The City will cause to be recorded in the Office of the County Recorder, a notice of completion, which is based on acceptance by the Carson City Board of Supervisors or the Carson City Regional Transportation Commission of the completed work embraced in the Contract.

Notice to Proceed - A) The written notice by the City to the Contractor authorizing the Contractor to proceed with the Work and establishing the date of commencement of the Work. B) Material Only Notice to Proceed - Written notice by the City to the Contractor authorizing the Contractor to proceed with ordering materials, preparing shop Drawings, and acquiring permits only.

Owner B Carson City, which has contracted for the performance of the Work.

Owner's Representative - The person designated in writing by the City to act as its agent on specified matters relating to this Contract. The Owner's Representative may or may not be the Engineer, the Construction Manager, or the Design Consultant.

Plans - All drawings or reproductions thereof pertaining to details of the Work and which are made a part of the Contract Documents. The term "Plans" has the same meaning as "Drawings". See Drawings

Project - The undertaking to be performed under the provisions of the Contract.

Provide - Shall be understood to mean furnish and install, complete in place.

Punch List - List of incomplete items of work and of items of work which are not in conformance with the Contract.

Reference Documents - Bulletins, Standards, Rules, Methods of Analysis or Test, Codes and Specifications of public or private agencies, Engineering Societies, or Industrial Associations. Reference

GENERAL CONDITIONS

shall be to the latest edition thereof, including Amendments, which are in effect and published at the time the Invitation for Bids is issued, unless a specific edition is identified, in which case reference shall be to such specific edition.

Right-of-Way - The area provided by the City for use in constructing the work covered by the Contract, including appurtenances thereto. The right-of-way so designated may be either temporary or permanent.

Schedule of Values - A list of all major items, or those requested by the City, including their respective quantities and unit prices for all Work and materials furnished by the Contractor in order to comply with the contract drawings and specifications, whether or not indicated in the approximate quantities or pertaining to the items of work listed therein.

Service Connection - All or any portion of a pipeline including sewer laterals, conduit, wire, cable or duct, including meters between a utility main distribution line and an individual customer or customers when served by a single connection.

Service Provider - A service provider is an organization, company, or business that provides a service for the Work, but does not perform the Work at the Project site.

Shall - Refers to actions by either the Contractor or the City and means the Contractor or City has entered into a covenant with the other party to do or perform the action.

Shop Drawings - All diagrams, drawings, illustrations, brochures, schedules, and all other data or submittals required by the Contract to be furnished by the Contractor illustrating fabrication, installation, dimensions, and other aspects of the Work.

Site - The property as described in the Special Conditions or as shown on the Drawings where the Project is to be constructed. See Work Area.

Special Conditions - Part of the Contract Documents that establishes special requirements peculiar to the Work and supplementary to the General Conditions.

Specifications - That part of the Contract Documents consisting of the General Conditions, Special Conditions, applicable Standard Specifications, Technical Specifications, other named standard specifications.

Standard Plans - The Standard Details for Public Works Construction, (Orange Book Details) sponsored and distributed by RTC of Washoe County, Washoe County, City of Reno, City of Sparks, Carson City and City of Yerington.

Standard Specifications - The Standard Specifications for Public Works Construction, (Orange Book Specifications) sponsored and distributed by RTC of Washoe County, Washoe County, City of Reno, City of Sparks, Carson City and City of Yerington; 1996 Edition with Revision No. 1 dated 12-15-1998, Revision No. 2 dated 5-1-2000, Revision No. 3 dated 11-08-2001, Revision No. 4 dated 2-27-2004, and Revision No. 5 dated 2-14-2007.

Subcontractor - A subcontractor is a person or entity who has a direct Contract with the Contractor to perform Work at the Site. The term subcontractor means a subcontractor or subcontractor's authorized representative.

Submittals - The information which is specified for submission to the Construction Manager in accordance with the specifications.

Substantial Completion - Substantial Completion is the stage in the progress of the Work when all Work is sufficiently complete in accordance with the Contract Documents so the City can occupy or utilize the essential components of the Project for its intended use.

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Sub-subcontractor - A sub-subcontractor is a person or entity who has a Contract with a subcontractor to perform any of the Work at the Site. The term sub-subcontractor means a sub-subcontractor or an authorized representative thereof.

Superintendent - the Contractor's authorized representative in responsible charge of the Work.

Supplier - Any person, firm, corporation, or organization who supplies materials or equipment for the Work, including that fabricated to a special design, and may also be a subcontractor or a sub-subcontractor, also referred to as Vendor.

Surety - The person, firm, corporation, or organization that joins with the Contractor in assuming the liability for the faithful performance of the Work and for the payment of all obligations pertaining to the Work in accordance with the Contract Documents by issuing the Bonds required by the Contract Documents or by law.

Technical Specifications- The specialized directions, provisions, and requirements of the Contract Documents for materials, equipment, construction systems, standards, and workmanship.

Title and Headings - The titles or headings of the section and subsections in the Contract Documents are intended for convenience of reference and shall not be considered as having bearing on their interpretation.

Total Base Bid - The base amount given in the Bid Schedule as either a lump sum bid, or the summation of the unit price bids multiplied by the estimated quantities as set forth in the bid form.

Utility- Public or private fixed improvement for the transportation of fluids, gases, power, signals, or communications and shall be understood to include tracks, overhead and underground wires, cables, pipelines, conduits, ducts, sewers or storm drains.

Work - The labor, materials, equipment, supplies, and other items necessary for the execution, completion, and fulfillment of the Contract.

Work Area - That area which is defined on the Contract Drawings as the City's Right-of-Way and/or temporary easement available to the Contractor for construction purposes. See Site.

Work Directive - A written directive to the Contractor issued after the effective date of the Contract and signed by the City's Construction Manager ordering an addition, deletion or revision in the Work, or responding to differing or unforeseen conditions under which the Work is to be performed, or to emergencies. A Work Directive may not change the Contract Price or Contract Time, but is the basis and evidence that the parties expect that the change directed or documented by the Work Directive will be incorporated in a subsequently issued Change Order following negotiations of the parties as to its effect, if any, on the Contract Price or Contract Time.

Working Day - A calendar day on which weather and other conditions not under the control of the Contractor will permit construction operations to proceed for at least 5 hours of the day with at least seventy-five (75) percent of the normal working force engaged in performing the current critical item(s) of work on the latest favorably reviewed Construction Schedule, exclusive, however, of Saturdays, Sundays, City recognized holidays, and any day that is incumbent upon the Contractor, by means of a Master Labor Agreement, to observe as a holiday. However, if the Contractor elects to work on such days, those days will be considered as a working day.

GC 1.6 ABBREVIATIONS

Whenever the following terms are used, the intent and meaning shall be as follows:

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Abbreviations Stand For

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AI	The Asphalt Institute
AIA	American Institute of Architects
AIEE	American Institute of Electrical Engineers
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Conditioning Association
ANSI	American National Standards Institute (formerly USASI, USAS, ASA)
APA	American Plywood Association
API	American Petroleum Institute
APWA	American Public Works Association
AREA	American Railway Engineers Association
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASLA	American Association of Landscape Architects
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
AWG	American Wire Gauge
AWPA	American Wood-Preserver's Association
AWS	American Welding Society
AWWA	American Water Works Association
CBR	California Bearing Ratio
COE	Department of the Army Corps of Engineers
CRSI	Concrete Reinforcing Steel Institute
DFPA	Douglas Fir Plywood Association
DIPRA	Ductile Iron Pipe Research Association
EIA	Electronic Industries Association
EPA	U.S. Environmental Protection Agency
ETL	Electronic Testing Laboratory
FHWA	Federal Highway Administration
HI	Hydraulic Institute
HMI	Hoist Manufacturers Institute
IAPMO	International Association of Plumbing and Mechanical Officials
ICBO	International Conference of Building Officials
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
IPCE	International Power Cable Engineers Association
ISA	Instrument Society of America
MUTCD	Manual on Uniform Traffic Control Devices
NAAMM	National Association of Architectural Metal Manufacturers
NBFU	National Board of Fire Underwriters
NBS	National Bureau of Standards
NDEP	Nevada Department of Environmental Protection
NDOT	Nevada Department of Transportation
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NOSHA	Nevada Occupational Safety and Health Act
NRS	Nevada Revised Statutes
NSF	National Sanitation Foundation
NWMA	National Woodwork Manufacturers Association
OSHA	Occupational Safety and Health Act

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PCA	Portland Cement Association
RTC	Regional Transportation Commission
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SSPC	Structural Steel Painting Council
TCA	Tile Council of America
UBC	Uniform Building Code
UPC	Uniform Plumbing Code
U/L or UL	Underwriters Laboratories
WCLIB	West Coast Lumber Inspection Bureau

GENERAL CONDITIONS

SECTION 2.0 CONTRACT ADMINISTRATION AND RESPONSIBILITIES: OWNER'S REPRESENTATIVE, CONSTRUCTION MANAGER, DESIGN CONSULTANT AND CONTRACTOR

GC 2.1 ADMINISTRATION

The Owner's Representative, the Construction Manager, and the Design Consultant will provide administration of the Contract as hereinafter discussed. The duties, responsibilities and limitations of authority of the Design Consultant and the Construction Manager as the representatives of the City during construction, as set forth in the Contract Documents, will not be modified or extended without approval of the City.

In case of the termination of the employment of the Design Consultant or the Construction Manager, the City shall appoint a Design Consultant or a Construction Manager whose status under the Contract Documents shall be that of the former Design Consultant or Construction Manager, respectively.

GC 2.2 OWNER'S REPRESENTATIVE

2.2.1 GENERAL

The Owner's Representative has the authority to act on behalf of the City on change orders, progress payments, Contract decisions, acceptability of the Contractor's work, and early possession.

2.2.2 CHANGE ORDERS

The Owner's Representative has the authority to accept or reject change orders and cost proposals submitted by the Contractor or as recommended by the Construction Manager.

2.2.3 PROGRESS PAYMENTS

The Owner's Representative has the authority to accept or reject requests for progress payments which have been submitted by the Contractor and recommended by the Construction Manager.

2.2.4 CONTRACT DECISIONS

Should the Contractor disagree with the Construction Manager's decision with respect to the Contract, the Contractor may appeal to the Owner's Representative in accordance with the provisions of the Contract.

2.2.5 ACCEPTABILITY OF WORK

The Owner's Representative has the authority to make the final determination of the acceptability of the Work. The Owner's Representative also has the authority to accept or reject the Design Consultant's recommendations regarding retention of non-conforming work as provided.

GC 2.3 CONSTRUCTION MANAGER

2.3.1 GENERAL

The Construction Manager is a representative of the City employed to act as advisor and consultant to the City in construction matters related to the Contract.

All instructions to the Contractor and all communications from the Contractor to the City or the Design Consultant shall be forwarded through the Construction Manager. The Construction Manager will have authority to act on behalf of the City only to the extent provided in the Contract Documents. The City has delegated its authority to the Construction Manager to make initial decisions regarding questions which may arise as to the quality or acceptability of materials furnished and work performed, and as to the manner of performance and rate of progress of the Work under the Contract. The Construction Manager shall interpret the intent and meaning of the Contract and shall make initial decisions with respect to the Contractor's fulfillment of the Contract and the Contractor's entitlement to compensation. The Contractor shall look initially to the Construction Manager in matters relating to the Contract.

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2.3.2 REPRESENTATIVE

The Construction Manager will generally be represented at the site by a resident Construction Manager, a resident engineer, or a resident inspector who will observe the progress, quality, and quantity of the Work to determine, in general, if the Work is proceeding in accordance with the intent of the Contract Documents. The

Construction Manager shall not be responsible for the Contractor's construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs in connection with the Work.

In accordance with the provisions detailed elsewhere in these General Conditions, the Construction Manager will make decisions relative to all matters of interpretation or execution of the Contract Documents.

2.3.3 INSPECTION OF CONSTRUCTION

The Construction Manager shall have the authority to reject Work and materials which do not conform to the Contract Documents, and to require special inspection or testing.

The Construction Manager may employ one or more inspectors to observe the Work and to act in matters of construction under this Contract. An inspector is not authorized to revoke, alter, or waive any requirements of the Contract Documents. The inspector is authorized to call to the attention of the Contractor any failure of the Work, materials or workmanship to conform to the Contract Documents. The inspector shall have the authority to reject materials or, in any emergency, suspend the Work. The Contractor may appeal any such issue which it disagrees with to the Construction Manager for decision.

2.3.4 ACCEPTABILITY OF THE WORK

The Construction Manager shall make a recommendation to the City as to the acceptability of the Work.

2.3.5 CHANGE ORDERS

The Construction Manager has the authority to initiate change orders; to reject change orders proposed by the Contractor or Design Consultant; to negotiate and recommend acceptance of change orders; or to order minor changes in the Work at no cost or time extension to the City.

2.3.6 CONSTRUCTION SCHEDULE

The Construction Manager has the authority to review and recommend acceptance of the Progress Schedule submitted by the Contractor at the start of the Work and subsequent revisions for conformance to the specified sequence of work and logic.

2.3.7 PROGRESS PAYMENTS

The Construction Manager has the authority to recommend acceptance or rejection of requests for progress payments which have been submitted by the Contractor.

2.3.8 FINAL ACCEPTANCE

The Construction Manager, with the assistance of the Design Consultant, will conduct inspections to determine substantial completion and final construction completion of the Work, and will receive and forward to the City, for the City's acceptance, written warranties, and related documents required by the Contract and assembled by the Contractor. The Construction Manager will recommend acceptance of the work by the City.

GC 2.4 DESIGN CONSULTANT

2.4.1 GENERAL

The Design Consultant will have the authority to act on behalf of the City to the extent provided in the Contract Documents.

GENERAL CONDITIONS

2.4.2 INTERPRETATIONS

The Design Consultant has the authority to be the initial interpreter of the technical requirements of the Contract Documents. Either party to the Contract may make written request to the Construction Manager for interpretations necessary for the proper execution or progress of the Work. The Construction Manager shall refer such written requests of the Contractor to the Design Consultant, who will render such interpretations. Where the Contractor has requested an interpretation from the Construction Manager, or been notified by the Construction Manager that such interpretation has been requested by the City, any Work done before receipt of such interpretations, if not in accordance with same, is subject to being removed and replaced or adjusted as directed by the Construction Manager without additional expense to the City.

2.4.3 ACCEPTABILITY OF THE WORK

The Design Consultant has the authority to make a recommendation as to the acceptability of the Work. The Design Consultant has the authority to recommend acceptance regarding the retention of defective work.

2.4.4 SITE OBSERVATIONS

The Design Consultant may visit the site at intervals appropriate to the stage of construction to become familiar with the progress and quality of the Work and to determine if the Work is proceeding in accordance with the Contract Documents. However, the Design Consultant will not be required to make extensive or continuous on-site inspections to check the quality or quantity of the Work.

2.4.5 SUBMITTALS

The Design Consultant has the authority to review and take other appropriate action upon the Contractor's submittals of shop drawings, product data, and samples for conformance with the design concept of the Work and the Contract Documents.

GC 2.5 CITY

2.5.1 GENERAL

The City, acting through the Owner's Representative or the Construction Manager, shall have the authority to act as the sole judge of the Work and materials with respect to both quantity and quality as set forth in the Contract.

2.5.2 ATTENTION TO WORK

The City shall notify the Contractor of the name of the individual designated as the Owner's Representative and the name of the individual designated by the Construction Manager to act as the Construction Manager's representative with the City's authority. The Construction Manager's designated representative will regularly be at the site of the Work.

2.5.3 INSPECTION

In addition to the Construction Manager, the City may employ one or more inspectors to observe the Work and to act in matters of construction under this Contract. An inspector is not authorized to revoke, alter, or waive any requirements of the specifications. The inspector is authorized to call to the attention of the Contractor any failure of the Work or materials to conform to the Contract Documents. The inspector shall have the authority to reject materials or, in any emergency, suspend the Work. The Contractor may appeal any such issue which it disagrees with to the Construction Manager for its decision.

Separate and independent from the inspection above, the Project may be inspected by Building Officials or other agency officials (i.e. Fire Officials, Nevada Department of Transportation) for code compliance. Such inspectors shall have the authority provided to them by local jurisdiction.

If upon routine inspection by the City a problem is found that creates a safety hazard for either City employees or the general public and the General Contractor or subcontractor is not on site, the City employees will correct the safety hazard and the General Contractor will be charged for the City's labor, materials and equipment for making the correction plus a fixed penalty fee of \$500 per occurrence.

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2.5.4 CITY'S RIGHT TO CARRY OUT THE WORK

If the Contractor and/or his/her surety defaults or neglects to carry out the Work in accordance with the Contract Documents, and fails within seven (7) days after receipt of written notice from the City to commence correction of such default or neglect with diligence and promptness, the City may make good such deficiencies.

Whenever, in the opinion of the Construction Manager, the Contractor has not taken sufficient precautions for the safety of the public or the protection of the Work to be constructed under this contract, or of adjacent structures or property which may be injured by processes of construction on account of such negligence, and whenever in the opinion of the Construction Manager, an emergency shall arise and immediate action shall be considered necessary in order to protect public or private, personal or property interest, then and in that event the Construction Manager, with or without notice or prior legal process to the Contractor, may provide suitable protection to the said interests by causing such work to be done and such material to be furnished as shall provide such protection as the Construction Manager may consider necessary and adequate.

In either case an appropriate Change Order shall be issued unilaterally deducting from the payments due the Contractor the cost of correcting such deficiencies and/or for performing such work, including compensation for the Design Consultant's, the Construction Manager's, and City's additional services made necessary by such default, neglect, failure or emergency.

The performance of such emergency work under the direction of the Construction Manager shall in no way relieve the Contractor from any damages which may occur during or after such precaution has been taken by the Construction Manager.

2.5.5 CITY'S RIGHT TO USE OR OCCUPY

The City reserves the right to use the sewer, water, reclaimed water, storm drains and roadway systems as well as the right to occupy and use any completed part or parts of the Work, providing these parts and facilities have been approved for use or occupancy by the City. The City anticipates to use the sewer, water, reclaimed water, storm drains and roadway systems throughout the construction contract, with no increase in the contract amount. Use of the systems will not change the contractual obligations of the Contractor regarding security, damage to the Work, insurance, the period for corrections to the Work, and the commencement of Warranties. The exercise of this right shall in no way constitute an acceptance of the total Work of this Contract, or any other part of the Work, nor shall it in any way prejudice the City's rights in the Contract, or any bonds guaranteeing the same. The Contract shall be deemed completed only when all the Work Contracted has been duly and properly performed and accepted by the City.

Prior to such occupancy or use, the City and Contractor shall agree in writing regarding the responsibilities assigned to each of them for payments, security, maintenance, heat, utilities, damage to the Work, insurance, the period for correction of the Work, and the commencement of warranties required by the Contract Documents.

In exercising the right to occupy or use completed parts of the Work, the City shall not make any use which will materially increase the cost to the Contractor without increasing the Contract Amount, nor materially delay the completion of the Contract without extending the time for completion.

The part or parts of the Work, if any, which the City anticipates to use or occupy during construction are generally noted in the Special Conditions. Failure to note a part or parts of the Work for use or occupancy shall not limit the City's right to use or occupy part or parts of the Work not noted.

2.5.6 CITY'S RIGHT TO PERFORM WORK AND TO AWARD SEPARATE CONTRACTS

The City reserves the right to perform the Work related to the Project with the City's own forces, and to award separate Contracts in connection with the Project or other Work on the site under these or similar Conditions of the Contract. If the Contractor claims that delay, damage, or additional cost is involved

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because of such action by the City, the Contractor shall make such claim as provided elsewhere in the Contract Documents.

When separate contracts are awarded for different portions of the Project or other Work on the Site, the term "Contractor" in the Contract Documents in each case shall mean the contractor who executes each separate agreement. The City will provide for the coordination of the Work of the City's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate therewith.

2.5.7 PROPERTY RIGHTS IN MATERIALS

Nothing in this Contract shall be construed as vesting in the Contractor any right of property in the materials used after they have been attached or affixed to the work or the soil, or after payment has been made for materials delivered to the Site of the Work, or stored subject to or under the control of the City. All such materials shall become the property of the City upon being so attached or affixed or upon payment for materials delivered to the Site of the Work or stored subject to or under the control of the City.

Soil, stone, gravel, and other materials found at the Site of the Work and which conform to the plans and specifications for incorporation into the Work may be used in the Work. No other use shall be made of such materials except as may be otherwise described in the plans and specifications.

2.5.8 CITY OBSERVED HOLIDAYS

The following are the legal Holidays observed by the City. The Contractor shall not perform any Work on a City observed Holiday. When the holiday falls on a Saturday, it is observed the prior Friday; when the holiday falls on a Sunday it is observed on the following Monday:

New Years Day - January 1st
Martin Luther King Day - 3rd Monday of January
Presidents Day - 3rd Monday of February
Memorial Day - last Monday of May
Independence Day - July 4th
Labor Day - 1st Monday of September
Nevada day - last Friday of October
Veterans Day - November 11th
Thanksgiving Day - 4th Thursday of November
Family Day - 4th Friday of November
Christmas Day - December 25th

Any other legal holiday declared by the President of the United States, the Governor of Nevada, or the Carson City Board of Supervisors.

2.5.9 AUDIT OF RECORDS

The City, acting through its Internal Auditor or an outside appointed auditor, may audit or direct the audit of any and all records of the Contractor pertaining to this Contract. In case any portion of this Contract is funded through NDOT, FHWA, or other agencies, they, too, shall have the right to audit any and all records of the Contractor pertaining to this Contract. Contractor agrees by entering this Contract to provide access to any and all records of Contractor pertaining to this Contract for a period of three (3) years after Contract acceptance.

2.5.10 ATTORNEY'S FEES

In the event the Contractor files a complaint or writ naming the City as a party and the Contractor fails to obtain all the relief requested in the complaint or writ, the Contractor shall pay the City reasonable attorney fees and the costs for participating in the litigation. It is specifically agreed that reasonable attorney fees shall be \$150.00 per hour for City-employed attorneys or the usual per hour fee charged by any other attorney retained by the City to participate in the litigation.

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GC 2.6 CONTRACTOR

2.6.1 OFFICE

The Contractor's office at the Project Site is hereby designated as the legal address of the Contractor for the receipt of documents, samples, notices, letters, and other articles of communication. Should the Contractor not maintain an office at the Project site, the Contractor shall notify the Construction Manager regarding the Contractor's legal address for its receipt of Project documents.

2.6.2 CONTRACTOR'S REPRESENTATIVE

At the pre-construction conference (see GC 3.9) the Contractor shall notify the City in writing of the name of the person and an alternate, if applicable, who will act as the Contractor's Representative(s) and shall have the authority to act in matters relating to this Contract. Such notification shall include the Representative's list of projects for which he/she held the position of Contractor's Representative for a three (3) year period. The list shall include the type of construction, the cost of construction, and the name of the owner(s) or agency(ies) including telephone numbers of contact persons. The Contractor's Representative shall have at least three (3) years of experience related to similar Work as described in the Contract Documents.

The Engineer and/or the City may reject the request for Contractor's Representative if, in the opinion of the Engineer and/or the City, the Contractor's Representative is not qualified to perform the Work. No additional payment or compensation will be considered for the rejection and subsequent hiring of Contractor's Representative. A replacement Contractor's Representative for a previously approved Contractor's Representative shall meet the same qualifications as listed above. Contractor shall submit the information requested above to demonstrate that the replacement Contractor's Representative meets the qualifications listed above.

The Contractor, acting through its Representative, shall give personal attention to, and shall manage the Work, so that it shall be prosecuted faithfully. The Contractor's Representative shall be an employee of the Contractor. Upon written request of the Contractor, this requirement may be waived by the City.

At all times during the progress of the Work, the Contractor's representative shall be personally present at the Project site, or a designated alternate shall be at the Project site who has the authority to act in matters relating to the Contract. The Contractor's representative or designated alternate shall have the authority to carry out the provisions of the Contract and to supply materials, equipment, tools, and labor without delay for the performance of the Work. If neither the Contractor's representative nor a designated alternate is at the Project site, the City acting through the Construction Manager shall have the authority to suspend the work until such a representative is at the Project site.

Before initial work is begun on the Contract, the Contractor shall file with the Construction Manager, and City, addresses and telephone numbers where the Contractor's and all subcontractors' representatives can be reached for emergency call outs during all hours, including nights and weekends, when work is not in progress.

2.6.3 CONSTRUCTION PROCEDURES

The Contractor will supervise and direct the Work. The Contractor shall determine the means, methods, techniques, sequences, and procedures of construction, except in those instances where the City, to define the quality of an item of work, specifies in the Contract a means, method, technique, sequence, or procedure for construction of that item of Work.

2.6.4 CONTRACTOR'S EMPLOYEES

The Contractor shall be responsible for the safety, adequacy, efficiency, and sufficiency of its employees.

If any person employed by the Contractor or its subcontractors, appear to the Construction Manager to be disorderly, disrespectful, rude, or intoxicated, such person shall be discharged from the site immediately by the Contractor.

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2.6.5 SUBCONTRACTORS

Subcontractors will not have a direct relationship with the City. The persons engaged in the Work, including employees of subcontractors, suppliers and service providers, will be considered employees of the Contractor. The Contractor will be responsible for their work and their work shall be subject to the provisions of the Contract. The Contractor is as fully responsible to the City for the acts and omissions of its subcontractors and of persons either directly or indirectly employed by them as the Contractor is for the acts and omissions of persons directly employed by the Contractor. Nothing contained in the Contract Documents shall create any Contractual relationship between any subcontractor and the City. References in the Contract Document to actions required of subcontractors, manufacturers, suppliers, or any party other than the Contractor, the City, the Construction Manager, or the Design Consultant shall be interpreted as requiring that the Contractor shall require such subcontractor, manufacturer, supplier, or party to perform the specified action, unless the Contract Documents specifically state that the Work is not included in the Contract.

The Contractor shall employ only subcontractors who are properly licensed in accordance with Nevada State Law. Changes to subcontractors listed in the Bid shall be made only with the approval of the City.

2.6.6 CONTRACTOR'S EQUIPMENT AND FACILITIES

The Contractor shall furnish and maintain in good condition all equipment and facilities as required for the proper execution and inspection of the Work. Such equipment and facilities shall meet all requirements of applicable ordinances and laws.

2.6.7 CITY-CONTRACTOR COORDINATION

A. Service of Notice

Notice, order, direction, request, or other communication given by the Construction Manager or City to the Contractor shall be deemed to be well and sufficiently given to the Contractor if delivered to the Contractor's Representative, or to the Contractor's address provided in the Bid Proposal.

B. Suggestions to Contractor

Plans or methods of work suggested by the City, the Construction Manager, or the Design Consultant to the Contractor, but not specified or required, if adopted or followed by the Contractor in whole or in part, shall be used at the risk and responsibility of the Contractor. The City, Construction Manager, or the Design Consultant assume no responsibility therefore, and in no way will be held liable for any defects in the Work which may result from or be caused by use of such suggested plan or method of work.

C. Cooperation

The Contractor shall conduct its operations so as to interfere as little as possible with those of other contractors or subcontractors on or near the Work. It is expressly understood that the City has the right and may award other contracts in connection with the Work so long as it does not unreasonably interfere with the Work under this Contract.

The Contractor shall afford the City, the Construction Manager and separate contractors reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their work, and shall connect and coordinate the Work with the others as required by the Contract Documents.

If any part of the Contractor's Work depends for proper execution or results upon the Work of the City or any separate contractor, the Contractor shall, prior to proceeding with the Work, promptly report to the Construction Manager any apparent discrepancies or defects in such other work that render it unsuitable for such proper execution and results. Failure of the Contractor to so report shall constitute an acceptance of the City's or separate contractor's work as fit and proper to

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receive the Work, except as to latent defects which subsequently become apparent in such work by others.

If requested by the Contractor, the City shall arrange meetings with other contractors performing work on behalf of the City to plan coordination of construction activities. The City shall keep the Contractor informed of the planned activities of other contractors.

Where one contractor's operations are within the limits or adjoin the operations of another contractor, each shall be responsible to the other for any damage, injury, loss, or expense which may be suffered on account of interference of operations, neglect or failure to finish work at the proper time, or of any other cause.

Differences and conflicts arising between the Contractor and other contractors employed by the City or between the Contractor and the workers of the City with regard to their work shall be submitted to the Construction Manager for his/her decision in the matter. If such separate contractor files a claim against the City on account of any delay or damage alleged to have been caused by the Contractor, the City shall notify the Contractor who shall, at the City's election, defend such claims at the Contractor's expense. If any judgment or award against the City arises from any such claim whether defended by City or by Contractor, the Contractor shall pay or satisfy said judgment or award and shall reimburse the City for all fees, including attorneys' fees, and costs which the City has incurred or for which it is liable.

2.6.8 PERMITS

Unless specifically stated in the Special Conditions to be provided by the City, the Contractor shall apply for, obtain, and comply with all terms, conditions and requirements attached to all permits, licenses, and agreements required by federal, state, or local agencies to perform work, construct, erect, test and start up any equipment or facility for this Contract. The City will provide, at no cost to the Contractor, the City "Building Permit" and/or the City "Engineering Permit". Where operating permits are required, the Contractor shall apply for and obtain such operating permits in the name of the City and provide the permit in an appropriate file folder when the City accepts substantial completion of the equipment or facility. The Contractor shall give all notices necessary or incidental to the due and lawful prosecution of the Work.

The Contractor shall apply for and obtain in its name all necessary permits and shall be responsible for satisfying all code requirements, calling for inspections, and obtaining final approvals. Code inspections will be coordinated with the Construction Manager. The Contractor shall comply with all conditions stipulated in the permits. The Contractor shall include in its Bid the fees for any permits and inspections that are required.

The Contractor shall also apply for and obtain all safety permits for excavations, tunneling, trenches, construction (building structure, scaffolding, or false work) and demolition required by OSHA. Any permits, licenses, agreements, and fees therefore required for the performance of work under this Contract and not specifically mentioned herein as having been obtained and paid by the City shall be included in the Contractor's Bid price. The cost of inspections associated with complying with permits, licenses, and agreements are to be included in the bid price. No time extensions shall be granted for time lost due to violations of permits.

The Contractor shall submit copies of all required Permits to the Construction Manager prior to proceeding with the Work covered by the respective Permits. If copies of all required Permits are not submitted to the Construction Manager prior to proceeding with the Work covered by the respective Permits, the Construction Manager may suspend the Work on the entire project, without any additional time or compensation to the Contractor, until the copies of the Permits are received.

2.6.9 CONTRACTOR'S RESPONSIBILITY FOR THE WORK AND MATERIALS

Until final acceptance of the Work, the Contractor shall have the charge and care of the Work and of the materials to be used therein, the Contractor shall bear the risk of injury, loss, or damage to any part

GENERAL CONDITIONS

thereof (regardless of whether partial payments have been made on such damaged portions of the Work) by the action of the elements or from any other cause, whether or not arising from the non-execution of the Work. The Contractor shall rebuild, repair, restore, and make good all injuries, losses, or damages to any portion of the Work or the materials occasioned by any cause, before its completion and acceptance, and shall bear the expense thereof, except for such injuries, losses, or damages as are directly and proximately caused by acts of the City. Where necessary to protect the work or materials from damage, the Contractor shall, at his/her expense, provide suitable drainage and erect such temporary structures as are necessary to protect the work or materials from damage. The suspension of work or the granting of an extension of time from any cause whatever shall not relieve the Contractor of his/her responsibility for the work and materials as herein specified.

In an emergency affecting the safety of life or property, including adjoining property, the Contractor, without special instruction or authorization, is authorized to act at his/her discretion to prevent such threatened loss or injury.

2.6.10 SURVEYS, LINES AND GRADES

The Contractor shall be responsible for all construction surveying and the setting of all construction control stakes. All construction surveying must be performed by the designated Project Surveyor who shall be a Nevada Licensed Professional Land Surveyor, or the Surveyor's subordinates. Contractor shall provide the name, license number and contact information of the Project Surveyor to the Construction Manager prior to the start of Work.

The Contractor shall be responsible for directing the Project Surveyor to establish all the survey control staking to accomplish the Work within the tolerances established in the Technical Specifications and per the requirements of the Nevada Administrative Code, for Construction Surveys, Sections 625.760 through 625.780.

2.6.11 LAWS TO BE OBSERVED

The Contractor shall keep fully informed of existing and pending county, state, and national laws and regulations and all municipal ordinances and regulations of the City which in any manner affect those engaged or employed in the Work and of all such orders and decrees of bodies having any jurisdiction or authority over the same. The Contractor shall protect and indemnify the City and its officers, agents, employees, and volunteers against any claim or liability arising from or based on the violation of any such laws, ordinances, regulations or orders, whether by the Contractor or its employees. If any discrepancy or inconsistency is discovered in the drawings, specifications or Contract for the Work in relation to any such law, ordinance, regulations, order or decree, the Contractor shall immediately report the same to the Construction Manager in writing.

The Contractor shall comply with all Federal, State and local laws relative to conducting business in Carson City including, but not limited to, licensing, labor and health laws, and applicable NRS. The laws of the State of Nevada will govern as to the interpretation, validity and effect of the Bid, its award, and the Contract.

A. Certified Payrolls - If Prevailing Wage Rates are Required

The Contractor and each subcontractor shall keep an accurate payroll record, showing the name, address, work classification, straight time, and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed in connection with the Project.

The payroll records shall be certified and shall be submitted weekly to the Construction Manager. Submission of the certified payrolls shall be a condition precedent for processing the monthly progress payment. The General Contractor shall collect the wage reports from the Sub-Contractors and ensure the receipt of a certified copy of each weekly payroll for submission to the City as one complete package.

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Pursuant to NRS 338.060 and 338.070, the Contractor hereby agrees to forfeit, as a penalty to the City, not less than Twenty Dollars (\$20) nor more than Fifty Dollars (\$50) for each calendar day or portion thereof that each worker employed on the Contract is paid less than the designated rate for any work done under the Contract, by the Contractor or any subcontractor under him/her, or is not reported to the City as required by NRS 338.070.

2.6.12 SAFETY

A. Contractor's Safety Responsibility

The Contractor shall be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the Work. This requirement shall apply continuously and not be limited to normal working hours. Safety provisions shall conform to U.S. Department of Labor (OSHA) Standards, the Nevada Occupational Safety and Health Act, and all other applicable Federal, State, County, and local laws, ordinances, codes, the requirements set forth below, and any regulations that may be detailed in other parts of these Contract Documents. Where any of these are in conflict, the more stringent requirement shall be followed.

No provision of the Contract Documents shall act to make the City, the Construction Manager or any party other than the Contractor responsible for safety. The Construction Manager shall not have authority for safety on the Project. The Contractor shall indemnify, defend (not excluding the City's right to participate) and hold harmless the City, Construction Manager, or other authorized representatives of the City, from and against any and all actions, damages, fines, suits, and losses arising from the Contractor's failure to meet all safety requirements and/or provide a safe work site.

If death or serious injuries or serious damages are caused, the accident shall be reported immediately to the Construction Manager, the City and OSHA. In addition, the Contractor must promptly report in writing to the Construction Manager all accidents whatsoever arising out of, or in connection with, the performance of the Work whether on, or adjacent to, the site giving full details and statements of witnesses. The Contractor shall make all reports as are, or may be, required by any authority having jurisdiction, and permit all safety inspections of the Work being performed under this Contract.

If a claim is made by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Construction Manager, giving full details of the claim.

B. Safety Program

The Contractor shall establish, implement, and maintain a written injury prevention program. Before beginning the Work, the Contractor shall prepare and submit to the Construction Manager a Safety Program that provides for the implementation of all of the Contractor's safety responsibilities in connection with the Work at the site and the coordination of that program and its associated procedures and precautions with safety precautions and procedures of each of its subcontractors. The Contractor shall be solely responsible for initiating, maintaining, monitoring, coordinating, and supervising all safety programs, precautions, and procedures in connection with the Work and for coordinating its programs, precautions, and procedures of any other prime Contractors and subcontractors performing work at the site.

C. Safety Supervisor

The Contractor shall appoint an employee as Safety Supervisor who is qualified and authorized to supervise and enforce compliance with the Safety Program. The Contractor shall notify the Construction Manager in writing prior to the commencement of work of the name of the person who will act as the Contractor's Safety Supervisor.

GENERAL CONDITIONS

D. Excavation Safety

The Contractor shall submit, in advance of excavation five feet or more in depth, detailed plans showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from hazard of caving ground during such excavation, and protection to adjacent structures during such excavation. Design calculations and plans must be sealed by a Civil or Structural Engineer registered in the State of Nevada.

Prior to commencing any excavation, the Contractor shall designate in writing to the Construction Manager the "Competent Person(s)" with the authority and responsibilities designated in the Construction Safety Orders.

E. Emergencies

In emergencies affecting the safety or protection of persons, the Work, or property at the site or adjacent thereto, the Contractor, without special instruction or authorization from the Construction Manager, is obligated to act to prevent threatened damage, injury or loss. The Contractor shall give the Construction Manager prompt notice if the Contractor believes that any changes in the Work or variations from the Contract Documents have been caused thereby. The Contractor shall not resume construction during an emergency, or after an emergency until directed to by the Construction Manager.

F. Safety Violations

The City shall have the authority to require the removal from the Project of any employee in responsible charge of the Work where safety violations occur.

2.6.13 FIRE PREVENTION AND CONTROL

Before setting any fires whatsoever, the Contractor shall notify the responsible Federal, State, or local agency having jurisdiction for the area concerned. The Contractor shall abide by such rules and instructions as to fire prevention and control and as to the place for burning as the Federal, State, or local agency having jurisdiction may prescribe. The Contractor shall take all necessary steps to prevent his/her employees from setting fires not required in the prosecution of the work. The Contractor shall be responsible for preventing the escape of fires set in connection with the work and shall under the direction of the appropriate agency, or, in the absence of an officer from any such agency, acting independently, extinguish all fires which may escape the work, whether or not set directly or indirectly as a result of his/her operations.

The Contractor shall be fully responsible for any damage caused to public and/or private property as a result of his/her burning operations, and shall leave no fires unattended at any time during these operations. He/She shall have available at the site at all times when burning is in progress, adequate equipment to extinguish the fires set by him/her, and to control the spread of fire outside of the burning areas. Burning during high wind conditions shall be expressly prohibited in order to prevent fire hazard, regardless of the prevailing season.

2.6.14 ERRORS OR DISCREPANCIES NOTED BY CONTRACTOR

It is the duty of the Contractor to promptly notify the Construction Manager in writing of any design, materials, or specified method that the Contractor believes may prove defective or insufficient. If the Contractor believes that a defect or insufficiency exists in design, materials, or specified method and fails to promptly notify the Construction Manager in writing of this belief, the Contractor waives any right to assert that defect or insufficiency in design, materials, or specified method at any later date in any legal or equitable proceeding against the City, or in any subsequent arbitration or settlement conference between the City and the Contractor.

The Construction Manager, on receipt of any such notice, will promptly investigate the circumstances and give appropriate instructions to the Contractor. Until such instructions are given, any work done by the Contractor after he/she comes to the belief that a defect or insufficiency exists in materials, or specified method which is directly or indirectly affected by such alleged defect or insufficiency in design, materials, or specified method will be at his/her own risk and he/she shall bear all costs arising therefrom.

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If the Contractor, either before commencing work or in the course of the work, finds any discrepancy between the specifications and the plans or between either of them and the physical conditions at the site of the work or finds any error or omission in any of the plans or in any survey, he/she shall promptly notify the Construction Manager of such discrepancy, error, or omission. If the Contractor observes that any plans or specifications are at variance with any applicable law, ordinance, regulation, order, or decree, he/she shall promptly notify the Construction Manager in writing of such conflict. The Construction Manager, on receipt of any such notice, will promptly investigate the circumstances and give appropriate instructions to the Contractor. Until such instructions are given, any work done by the Contractor after his/her discovery of such error, discrepancy, or conflict will be at his/her own risk and he/she shall bear all costs arising therefrom.

2.6.15 INDEMNIFICATION

The Contractor hereby agrees to indemnify, hold harmless, and defend, not excluding the City's right to participate, the Construction Manager, the City and its elected officials, officers, employees, agents, volunteers, other retained consultants and representatives, from and against any and all liability, claims, actions, damages, legal or administrative proceedings, losses and expenses, including without limitations, reasonable attorney's fees and costs (including attorney's fees in establishing indemnification of whatsoever nature), litigation costs, penalties, fines, judgments, or decrees by reason of any death, injury or disability to or of any person and/or damages to any property or business, including loss of use, arising out of any alleged negligent or willful acts, errors or omissions of the Contractor, Contractor's employees, agents, or subcontractors arising out of or suffered, directly or indirectly, by reason of or in connection with the performance of the Work under this Contract.

The Contractor guarantees the payment of all claims for materials, supplies and labor, and all other claims against it or any subcontractor, made in connection with this Agreement.

2.6.16 INSPECTIONS

The right of inspection and acceptance or rejection of contracted work by the City shall not make the Contractor an agent of the City, and the liability of the Contractor for all damages to persons or to public or private property, arising from the Contractor's execution of the work, shall not be lessened because of such inspections.

2.6.17 CONTRACTOR IS AN INDEPENDENT CONTRACTOR

This Contract does not create an employee/employer relationship between the parties. It is the parties' intention that the Contractor will be an independent contractor and not Carson City's employee for all purposes, including but not limited to the application of the Fair Labor Standards Act, the Federal Unemployment Tax Act, the provisions of the Internal Revenue Code, and Nevada State revenue and taxation laws. The Contractor will retain sole and absolute discretion in the judgment of the manner and means of carrying out the Contractor's activities and responsibilities hereunder. The Contractor agrees that it is a separate and independent enterprise from the public employer, that it has full opportunity to find other business, that it has made its own investment in its business and that it will utilize industry standard of care necessary to perform the Work. This Contract shall not be construed as creating any joint employment relationship between the Contractor and the City, and the City will not be liable for any obligation incurred by the Contractor, including but not limited to unpaid minimum wages and/or overtime premiums.

2.6.18 VALUE ENGINEERING PROPOSALS

Value Engineering Proposals (VEP) may be submitted by the Contractor in writing for modifying the plans, specifications or other requirements of the Contract for the purpose of reducing the total cost of construction without reducing design capacity or quality of the finished product. If accepted, net savings resulting from a VEP will be shared by the City and the Contractor on a 50%-50% basis.

GENERAL CONDITIONS

The requirements herein apply to all VEP's initiated and developed by the Contractor and which are identified as such at the time of submission. Nothing herein shall be construed as requiring consideration or approval of a VEP submitted hereunder.

Each VEP shall result in a net savings over the Contract costs without impairing essential functions and characteristics of the item(s) or of any other part of the project, including but not limited to environmental considerations, service life, reliability, economy of operation, ease of maintenance, desired aesthetics and safety.

Submit the following information with each VEP:

- 5) A statement that the proposal is submitted as a VEP;
- 6) A statement concerning the basis for the VEP and benefits to the City together with an itemization of the Contract requirements affected by the VEP;
- 7) A detailed estimate of the cost under the existing Contract and under the VEP;
- 8) Proposed specifications and recommendations as to how such VEP changes are to be accomplished; and
- 9) A statement as to the time by which a Contract Change Order adopting the VEP must be issued so as to obtain the maximum cost effectiveness.

The VEP will be processed in the same manner as prescribed for any other proposal which would necessitate issuance of a Contract Change Order. The City may accept in whole or in part any VEP by issuing a Contract Change Order which will identify the VEP on which it is based. The City will not be liable for failure to accept or act upon any VEP submitted pursuant to these requirements nor for any delays to the work attributable to any such proposal. Until a proposal is effected by Contract Change Order, Contractor remains obligated to perform under the terms and conditions of the Contract. If an executed Contract Change Order has not been issued by the date upon which the proposal specifies that a decision thereon should be made, or such date as the Contractor may have subsequently specified in writing, such proposal shall be deemed rejected.

The Contract Change Order effecting the necessary Contract modification will establish the net savings agreed upon, will provide for adjustment in the Contract prices and will indicate the new savings to be equally divided between the City and the Contractor. Contractor shall absorb all costs incurred in preparing a VEP for submission. All reasonably incurred costs of reviewing and administering the VEP will be borne by the City. The City reserves the right to include in the agreement any conditions it deems appropriate for consideration, approval, and implementation of the proposal. The Contractor's 50% share of the net savings shall constitute full compensation to him/her for effecting all changes pursuant to the agreement.

Acceptance of the VEP and performance of the work thereunder will not change the Contract time limit as a result of the VEP, unless specifically provided for in the Contract Change Order authorizing the VEP.

Proposed changes in the basic design of a bridge or pavement type, traffic control plan, or changes which require different right-of-way limits, will not normally be considered as an acceptable VEP.

The Construction Manager shall be the sole judge of the acceptability of a VEP.

Subject to the provisions contained herein, the City or any other public agency shall have the right to use all or part of any accepted VEP without obligation or compensation of any kind to the Contractor.

GENERAL CONDITIONS

In the event a VEP is accepted by the City, the provisions of General Conditions Section 6.4.4, Unit Price Adjustments Due to Increased or Decreased Quantities, which pertain to adjustment of Contract unit prices due to alterations of Contract quantities, will not apply to items adjusted or deleted as a result of effecting the VEP by Contract Change Order.

SECTION 3.0 PROGRESS OF WORK, MEETINGS, SCHEDULES

GC 3.1 BEGINNING OF WORK

The Contractor shall begin work within ten (10) calendar days of the effective date of the Notice to Proceed and shall diligently prosecute the same to completion within the Contract Time.

GC 3.2 PERFORMANCE OF THE WORK

Unless otherwise specified in the Special Conditions, the Contractor shall furnish all materials, labor, permits, tools, equipment, water, light, power, transportation, superintendence, temporary construction of every nature, and incidentals, including but not limited to, dust and traffic control measures, and to perform all work involved in executing the Contract in a satisfactory and workmanlike manner within the time specified.

GC 3.3 PLANS AND SPECIFICATIONS FURNISHED BY THE CITY

The City will furnish to the Contractor, free of charge, up to five (5) copies of the contract drawing and specifications. Additional sets shall be provided by the City at cost of the City's standard billing rate for labor of reproduction and the cost of reproduction itself. The five (5) sets of plans and specifications shall be available to the Contractor at the time he/she takes out the Carson City permit at the City's One Stop Permit Center located at the Building Department, 2621 Northgate Lane, Suite 6.

The location of the Work, its general nature and extent, and the form and detail of the various features are shown on the Contract Drawings accompanying and made a part of these Contract Documents.

GC 3.4 ORDER OF WORK

When required by the Contract Documents, the Contractor shall follow the sequence of operations as set forth therein. Full compensation for conforming with such requirements will be considered as included in the prices paid for the various Contract items of work and no additional compensation will be allowed therefore.

GC 3.5 TIME OF COMPLETION

Time shall be of the essence of the Contract. The Contractor shall diligently prosecute the Work so that the various portions of the Project shall be complete and ready for use within the time specified. It is expressly understood and agreed by and between the Contractor and the City that the Contract Time for completion of the Work described herein is a reasonable time taking into consideration the average climatic and economic conditions and other factors prevailing in the locality and the nature of the Work.

Failure of the Contractor to perform any covenant or condition contained in the Contract Documents within the time period specified shall constitute a material breach of this Contract entitling the City to terminate the Contract unless the Contractor applies for, and receives, an extension of time in accordance with the procedures set forth in GC 3.15, EXTENSION OF TIME.

Failure of the City to insist upon performance of any covenant or condition within the time period specified in the Contract Documents shall not constitute a waiver of the Contractor's duty to complete the performance within the designated periods unless the City has given a waiver in writing.

The City's agreement to waive a specific time provision or to extend the time for performance shall not constitute a waiver of any other time provision contained in the Contract Documents. Failure of the Contractor to complete the performance promptly within any additional time authorized or in any waiver or extension of time shall constitute a material breach of this Contract entitling the City to terminate.

GC 3.6 MEANS AND METHODS

GENERAL CONDITIONS

It is expressly stipulated that the drawings, specifications, and other contract documents set forth the requirements as to the nature of the completed Work and do not purport to control the method of performing work except in those instances where the nature of the completed Work is dependent upon the method of performance.

Neither the City, Design Consultant, nor the Construction Manager will be responsible for or have control or charge of construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work. Neither the City, Design Consultant nor the Construction Manager will be responsible for or have control or charge over the acts or omissions of the Contractor, or any of their subcontractors, agents or employees, or any other persons performing any of the Work. Any general control of the Work exercised by the City or its authorized representatives shall not make the Contractor an agent of the City, and the liability of the Contractor for all damages to persons and/or to public or private property arising from the Contractor's execution of the Work shall not be lessened because of such general control.

Neither the inspection by the City, Design Consultant, or Construction Manager, nor any order, measurement, approved modification, or payment of monies, nor acceptance of any part or whole of the Work by the City, Design Consultant, Construction Manager, or their agents shall operate as a waiver of any provision of the Contract.

GC 3.7 CITY-FURNISHED MATERIALS

Only materials and equipment specifically indicated in the Contract Documents shall be furnished by the City and such materials and equipment will be made available as designated in the Special Conditions. The Contractor shall be prepared to load or unload and to properly protect all such material and equipment from damage or loss. The cost of loading, unloading, hauling, handling, demurrage and storage, and placing City-furnished materials into the Work shall be considered as included in the price bid for the Contract item involving such City-furnished material.

Contractor shall inspect and assure itself of the amount and soundness of such material or equipment at the time of receiving such materials. Any City-furnished material or equipment lost or damaged from any cause after the Contractor has taken control of said material or equipment, shall be replaced by the Contractor at his/her expense.

GC 3.8 DEFECTIVE AND UNAUTHORIZED WORK

Any materials or workmanship which does not conform to the requirements of the Contract Documents shall be considered defective and shall be remedied or removed and replaced by the Contractor, together with any other work which may be displaced in so doing, and no additional compensation will be allowed to the Contractor for such removal, replacement, or remedial work. All nonconforming materials shall be immediately removed from the Site.

Any work done beyond the limits of work, lines, and grades shown on any approved plans or established by the Construction Manager, or any changes in, additions to, or deductions from the work done without written authority, will be considered as unauthorized and will not be paid. Work so done may be ordered remedied, removed, or replaced at the Contractor's expense.

Upon failure on the part of the Contractor to comply with any order of the Engineer made under the provisions of this Section, the Engineer shall have authority to cause nonconforming materials, rejected work, or unauthorized work to be remedied, removed, or replaced at the Contractor's expense and to deduct the costs from any monies due or to become due the Contractor.

These provisions shall have full effect regardless of the fact that the defective work may have been done or the defective materials used with the full knowledge of the Engineer or his/her representative. The fact that the Engineer may have previously overlooked such defective work shall not constitute an acceptance of any part of it. Nothing stated herein shall be deemed to shorten the term of any statute of limitations applicable to claims which the City may have against the Contractor.

GC 3.9 PRE-CONSTRUCTION CONFERENCE

GENERAL CONDITIONS

The Construction Manager will schedule a Pre-Construction Conference at the Project site or other established location at the time of Notice to Proceed and/or execution of the Contract and prior to commencement of construction activities.

3.9.1 ATTENDEES

The City, Design Consultant, Construction Manager, Contractor and its superintendent, subcontractors, and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work.

3.9.2 AGENDA

The Construction Manager will prepare an agenda for discussion of significant items relative to Contract requirements, procedures, coordination and construction. Minutes shall be kept by the Construction Manager and distributed to all attendees.

GC 3.10 PROGRESS MEETINGS

The Construction Manager will conduct progress meetings at the Project site or other established location at regularly scheduled intervals which may be as frequent as weekly. Frequency of meetings shall be determined at the Pre-Construction Conference. Meeting minutes will be taken and distributed by the Construction Manager.

3.10.1 ATTENDEES

The City, Design Consultant, Construction Manager, Contractor, and its superintendent may each be represented at these meetings. Attendance by subcontractors, suppliers, utilities and other entities is subject to issues and/or items of the agenda which may require attendance.

3.10.2 AGENDA

Agenda may include, but not necessarily be limited to: review, correct or approve minutes of the previous progress meeting, review of items of significance that could affect progress, review/discuss topics as appropriate to the current and future status and/or needs of the Project, review the progress of the Work in the preceding week and in the subsequent week, coordinate the Work with public agencies and/or other Contractors as required, and allow the Construction Manager to plan his/her activities for testing, inspection, etc.

GC 3.11 CONSTRUCTION SCHEDULES

Construction schedules are required for all Contracts. The type of construction schedule required, that is, Construction Schedule (A) or Construction Schedule (B) will be specified in the Special Conditions. Compensation for the Work under this item will be included within the other bid items.

3.11.1 CONSTRUCTION SCHEDULE (A)

A. General

The schedule shall be submitted at the Pre-Construction Conference and must be favorably reviewed by the Construction Manager and the City before the first partial payment can be made. NOTE: The Construction Schedule must include and account for the total contract time specified in the Contract Documents.

B. Base Schedule

The Contractor shall submit the schedule based on either the bar chart method or the Critical Path Method (CPM). The schedule shall indicate preceding activity relationships and/or restraints where applicable and a controlling path shall be indicated. The schedule shall be time-scaled and shall be drafted to show a continuous flow from left to right. The construction schedule shall clearly show the sequence of construction operations and specifically list:

1. The start and completion dates of primary work items or components.

GENERAL CONDITIONS

2. The dates of submittals, procurement, delivery, installation and completion of each major equipment and material requirement.
3. Progress milestone events or other significant stages of completion.
4. The lead time required for testing, inspection and other procedures required prior to acceptance of the Work.
5. All activities, other than procurement activities, shall be cost-loaded. Activities shall be no longer than 14 calendar days, except for submittals and delivery items. If an activity takes longer, it shall be broken into appropriate segments of work for measurement of progress. This limitation may be waived, upon approval of the Construction Manager, for repetitious activities of longer durations for which progress can be easily monitored.

C. Reports

The Bar Charts or CPM Schedules shall be prepared as follows:

1. Bar Chart: A manually generated report which lists each primary activity description, early start and finish dates, and all preceding and succeeding activities. Report shall indicate all critical activities. A report with the above information shall be provided with each monthly update.
2. CPM Schedule: A CPM network report sorted by I-J or activity number which lists each activity description, early start and finish dates, preceding and succeeding activities and restraints, including lead/lag durations. The report shall show the critical path.
 - § CPM network report sorted by total float.
 - § CPM network report sorted by early start.

3.11.2 CONSTRUCTION SCHEDULE (B)

A. General

The Construction Schedule under this requirement will also be referred to as the CPM Schedule.

The Contractor shall designate, in writing, an authorized representative in its firm who will be responsible for the preparation, revising, and updating of the CPM Schedule. The Contractor's representative shall have direct Project control and complete authority to act on behalf of the Contractor in fulfilling the construction scheduling requirements set forth herein, and such authority will not be interrupted throughout the duration of the Project. The requirements for the CPM Schedule are included to assure adequate planning and execution of the Work and to assist the Construction Manager and the City in appraising the reasonableness of the proposed schedule and evaluating progress of the Work.

Within seven (7) days from award of the Contract, the Contractor shall submit to the Construction Manager demonstration of competence in the use of CPM Scheduling, including evidence of the use of CPM Scheduling on a project of similar value and complexity. In the event of the failure of the Contractor to satisfy the Construction Manager of its CPM Scheduling competence, the Contractor will be required to employ a qualified CPM consultant who regularly performs these services and who in the opinion of the Construction Manager possesses the qualifications required to perform CPM Scheduling for this Project.

B. Preliminary Construction Schedule

GENERAL CONDITIONS

At the Pre-Construction Conference, the Contractor shall submit copies of a Preliminary Construction Schedule in the form of a precedence diagram covering the following Project phases and activities:

1. Procurement and Submittals, including shop drawings, fabrication, and delivery of key and long lead time procurement activities.
 - a. The Contractor's submittal information shall show intended submittal dates and shall be incorporated into the base project schedule.
 - b. The delivery information shall include realistic delivery dates for the procurement activities.
2. The activities planned for the first 90 days in the execution of the Work.
3. The approach to scheduling the remaining activities or phases of the Work. The Work for each phase or activity shall be represented by at least one summary activity and the sum of the summary activities shall equal the Contract Time.
4. Approximate cost and duration for each summary activity representing the Contractor's best estimate for the Work the summary activity represents.
5. Projected monthly cash flow.

C. Base Schedule Submittal

The Contractor shall submit an acceptable Critical Path Method (CPM) Schedule to the Construction Manager within thirty (30) days after the receipt of the Notice to Proceed. Subsequent revisions to said schedule shall be submitted as set forth hereinafter.

The Construction Manager shall review the schedule and provide any comments, its favorable review of the schedule, or request a meeting to review the schedule with the Contractor within fifteen (15) days of receipt of the schedule. If requested, the Contractor shall participate in a review and evaluation of the proposed network diagrams and analysis by the Construction Manager. Any revisions necessary as a result of this review shall be resubmitted for review by the Construction Manager within ten (10) days. When completed, the favorably reviewed schedule shall then be the schedule to be used by the Contractor for planning, organizing, and directing the Work, and for reporting progress. If the Contractor thereafter desires to make significant changes in its method of operating and scheduling, the Contractor shall notify the Construction Manager in writing stating the reasons for the change. Only one progress payment will be made prior to acceptance of the CPM Schedule. Neither the Contractor nor the City shall own the "float".

To the extent that the favorably reviewed initial Construction Schedule, or revisions thereto, indicate anything not jointly agreed upon, it shall be deemed to be not favorably reviewed by the Construction Manager. Any omission of work from the detailed schedule, otherwise required for Contract compliance, will not excuse the Contractor from completing such work within any applicable completion date.

The CPM Schedule shall utilize a (CPM) format using either the precedence or arrow diagramming method. The schedule shall show completion of the Project at the Contract Completion Date or before.

The schedule shall be computer generated utilizing a scheduling program identified in the Special Conditions. The Contractor shall provide a compact disk or other electronic means approved by the Construction Manager for the initial base schedule and all monthly updates with the network

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diagram and mathematical analyses. The program shall be capable of accepting revised completion dates as modified by approved time adjustments and re-computations of all tabulation date and float accordingly. The CPM schedule system shall consist of diagrams and accompanying mathematical analyses network diagram. See Special Conditions for further details regarding scheduling requirements.

D. Cash Flow Projection

A cash flow projection shall be submitted with the Construction Schedule. This cash flow projection shall be revised and resubmitted when revisions of the Construction Schedule will result in significant changes to the projected cash flow.

GC 3.12 NOTICE OF DELAYS

When the Contractor foresees a delay in the prosecution of the Work and, in any event, within seventy-two (72) hours of a delay, the Contractor shall notify the Construction Manager in writing of the probability of the occurrence, the estimated or actual extent of the delay, and its cause. The Contractor shall take immediate steps to prevent, if possible, the occurrence or continuance of the delay. The Contractor agrees that no claim shall be made for delays which are not called to the attention of the Construction Manager within the time specified above.

Except for Standby Time for City utilities as provided for in GC 7.10, COORDINATION/COOPERATION WITH UTILITIES, the Contractor's sole remedy for any delay in the Work, regardless of the alleged cause of the delay, shall be an extension of the contract time; the Contractor shall not be entitled to any delay damages, wage escalation, material escalation, extended job site or home office overhead or supervision, or additional compensation of any kind.

3.12.1 NON-EXCUSABLE DELAYS

Non-excusable delays in the prosecution of the Work shall include delays which could have been avoided by the exercise of care, prudence, foresight, and diligence on the part of the Contractor or its subcontractors, at any tier level, or suppliers. Time lost due to violations of permit requirements shall be non-excusable delays. No time extension or other compensation shall be granted for time lost due to non-excusable delays.

3.12.2 EXCUSABLE DELAYS

Excusable delays in the prosecution or completion of the Work shall include delays which result from causes beyond the control of the Contractor and which could not have been avoided by the exercise of care, prudence, foresight, and diligence on the part of the Contractor or its subcontractors, at any tier level, or suppliers.

Delays caused by acts of God, fire, unusual storms, floods, earthquakes, strikes, labor disputes, freight embargoes, and shortages of materials shall be considered as excusable delays insofar as they prevent the Contractor from proceeding with at least seventy-five (75) percent of the normal labor and equipment force for at least five (5) hours per day toward completion of the current critical activity item(s) on the latest favorably reviewed Construction Schedule.

Excusable delays shall not entitle the Contractor to any additional compensation. The sole remedy of the Contractor shall be to seek an extension of time.

3.12.3 STANDBY TIME

As provided in GC 7.10, COORDINATION/COOPERATION WITH UTILITIES, if the Contractor is delayed due to the City's non-marking, mis-marking or mis-locating the City's main line water mains, reclaimed water mains, sanitary sewer main lines and storm drains, the City will be responsible for repairs, damages and standby time caused the Contractor. Compensation to the Contractor for such repairs, damages or standby time shall be calculated on the basis of GC 6.4.3, FORCE ACCOUNT PAYMENT. Note: this provision does not apply to service laterals/connections.

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Also Note: per NRS 455.082, the approximate location of a subsurface installation marked in response to a request of USA means a strip of land not more than 24 inches on either side of the exterior surface of a subsurface installation.

3.12.4 WEATHER DELAYS

Should inclement weather conditions or the conditions resulting from weather prevent the Contractor from proceeding with seventy-five (75) percent of the normal labor and equipment force engaged in the current critical activity item(s) on the latest favorably reviewed Construction Schedule for a period of at least five (5) hours per day toward completion of such operation or operations, and the crew is dismissed as a result thereof, it shall be a weather delay day. The Contractor may be granted a non-compensable time extension should the critical path activities be affected by the weather delay.

3.12.5 CONCURRENT DELAYS

Concurrent delays are those delay periods when the prosecution of the Work is delayed during the same period of time due to causes from a combination of the delays, City-caused and Contractor-caused. Time extensions will be granted on the basis of a time impact analysis from the CPM Schedule.

GC 3.13 LIQUIDATED DAMAGES

It is agreed by the parties to the Contract that time is of the essence in the completion of this Work, and that in case all the Work called for under the Contract is not completed before or upon the expiration of the time limit as set forth in these Contract Documents, or as modified by extensions of time granted by the City, damage will be sustained by the City. As it may be impracticable to determine the actual delay damage; it is, therefore, agreed that the Contractor shall pay liquidated damages to the City in the amount set forth in the Construction Contract, per calendar day for each and every calendar day's delay beyond the time prescribed to complete the Work. The Contractor agrees to pay such liquidated damages and in case the same are not paid, agrees that the City may deduct the amount thereof from any monies due or that may become due the Contractor under the Contract.

The Contractor shall not be deemed in breach of this Contract nor shall liquidated damages be collected because of any delays in the completion of the Work due to unforeseeable causes beyond the control and without the fault or negligence of the Contractor provided the Contractor requests an extension of time in accordance with the procedures set forth in GC 3.15, EXTENSION OF TIME. Unforeseeable causes of delay beyond the control of the Contractor shall include Acts of God, acts of a public enemy, acts of government, or acts of the City, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and weather, or delays of subcontractors due to such causes, or delays caused by failure of the City or the facilities.

GC 3.14 RIGHTS BEYOND LIQUIDATED DAMAGES

Liquidated damages shall not preclude the City from claiming and collecting damages on account of delay, price changes, loss of other contracts, loss of income, and or any inability of the City to fulfill other obligations, if such damages are direct or consequential arising out of the failure of the Contractor to perform under the terms, conditions and requirements of this Contract.

GC 3.15 EXTENSION OF TIME

The time specified for completion of all of the Work or any part of the Work may be extended only by a written change order executed by the City. The Construction Manager may, at his/her discretion, recommend that the City extend the time for completion of the Work without invalidating any of the provisions of the contract and without releasing the surety.

Extensions of time, when recommended by the Construction Manager, will be based upon the effect of delays to the project as a whole and will not be recommended for non-controlling delays to minor portions of the Work, unless it can be shown that such delays did, in fact, delay progress of the project as a whole. Excusable delays may justify an extension of time.

No extension of time for completion will be allowed for non-excusable delays.

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Written requests for an extension of time must be delivered to the Construction Manager within seventy-two (72) hours following the date of the occurrence which caused the delay. The request must state the cause of the delay, the date of the occurrence causing the delay, and the amount of additional time requested. The delay causing condition must affect an activity on the critical path of the latest favorably reviewed Construction Schedule. Requests for extensions of time shall be supported by all evidence reasonably available or known to the Contractor which would support the extension of time requested. Requests for extension of time failing to include the information specified in this Section, and requests for extensions of time which are not received within the time specified above, shall result in the forfeiture of the Contractor's right to receive any extension of time requested.

If the Contractor is requesting an extension of time because of a weather delay, Contractor shall supply daily reports to the Construction Manager describing such weather and the work which could not be performed that day because of such weather or conditions resulting therefrom and which Contractor otherwise would have performed. The City's acceptance of the daily reports shall not be deemed an admission of the Contractor's right to receive an extension of time or a waiver of the City's right to strictly enforce the time provisions contained in the Contract Documents.

When the Contractor has submitted a request for an extension of time in accordance with the procedures of this Section, the City will ascertain the facts and extent of the delay and extend the time for completing the Work if, in its judgment, the findings of fact justify such an extension, and its findings of fact thereon shall be final and conclusive. An extension of time may be granted by the City after the expiration of the time originally fixed in the Contract or as previously extended, and the extension so granted shall be deemed to commence and be effective from the date of such expiration.

GC 3.16 TEMPORARY SUSPENSION OF WORK

The City may order suspension of all or any part of the Work if:

- (1) Unsuitable weather and such other conditions beyond the control of the Contractor prevent satisfactory and timely performance of the Work; or
- (2) The contractor does not comply with the Contract or the Engineer's orders.

If the Work is suspended for reason (1) above, the period of work stoppage will be counted as non-working days. However, if the Construction Manager believes the Contractor should have completed the suspended work before the suspension, all or part of the suspension period may be counted as working days. The Construction Manager will set the number of non-working days (or parts of days) by deciding how long the suspension delayed the entire project. An extension of time may be granted. Also, the Contractor will be compensated for its actual costs plus the standard markup for overhead and profit for performing all work necessary to provide a safe, smooth, unobstructed passageway through the Site for use by the public, pedestrian and vehicular traffic during the period of such a suspension of work.

If the Work is suspended for reason (2) above, the period of work stoppage will be counted as working days and no extension of time will be granted. The lost work time, however, shall not relieve the Contractor from any contract responsibility.

If the Contractor fails to correct defective work as required, or fails to carry out the Work in accordance with the Contract Documents or any other applicable rules and regulations, the City, in writing, may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the City to stop the Work shall not give rise to any duty on the part of the City to exercise this right for the benefit of the Contractor or any other person or entity. All delays in the Work occasioned by such stoppage shall not relieve the Contractor of any duty to perform the Work or serve to extend the time for the Work completion. Any and all necessary corrective work done in order to comply with the Contract Documents shall be performed at no cost to the City. When ordered by the City to suspend or resume work, the Contractor shall do so immediately. In all cases of suspension of construction operations, the work shall not again be resumed until permitted by written order of the City.

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In the event that a suspension of Work is ordered for reason (2) above, as provided in this Section, the Contractor shall perform all work necessary to provide a safe, smooth, and unobstructed passageway through the Site for use by public, pedestrian and vehicular traffic, during the period of such a suspension. Should the Contractor fail to perform the Work as specified, the City may perform such work and the cost thereof may be deducted from monies due the Contractor under the Contract. The Contractor will be responsible for all damage to the Work that may occur during suspensions of work. The Contractor will not be entitled to any additional compensation nor allowance for overhead or profit incurred in connection with this type of suspension.

GC 3.17 PROTECTION OF ANTIQUITIES

State and Federal laws pertaining to the protection and preservation of sites or objects of archeological, paleontological or historic interest shall be observed by the Contractor performing this Work.

When features of archeological, paleontological or historic interest are encountered or unearthed in material pits, the roadway prism, or other excavation, the Contractor shall stop work in the immediate vicinity of such feature, protect it from damage or disturbance, and report promptly to the State Historic Preservation Office at (775) 684-3448 and the Construction Manager.

Work shall not be resumed in the immediate area until the Contractor is advised by the authorities having jurisdiction that study or removal of the feature or features has been completed. The Contractor may be allowed an appropriate contract extension of time, as provided for in these General Conditions, for construction time lost.

GC 3.18 CONTRACT TERMINATION

If at any time the Contractor is determined to be in material breach of the Contract, notice thereof in writing will be served upon the Contractor and its sureties, and should the Contractor neglect or refuse to promptly provide means for satisfactory compliance with the Contract, within the time specified in such notice, the City in such case shall have the authority to terminate the operation of the Contract.

- A. The City may terminate the Contract if the Contractor:
 - 1. Fails to maintain bonding, Nevada State Contractor's Board License, State Industrial Insurance requirements or insurance policies for limits as defined in the Contract Documents;
 - 2. Persistently or repeatedly refuses or fails to supply properly skilled workers or proper materials;
 - 3. Fails to make payment to subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the subcontractors;
 - 4. Persistently disregards laws, ordinances, or rules, regulations or order of a public authority having jurisdiction;
 - 5. Otherwise makes a material breach of a provision of the Contract Documents; or
 - 6. Contractor fails to maintain safe working conditions.

- B. When any of the above reasons exist, the City may provide, without prejudice to any other rights or remedies of the City and after giving the Contractor and the Contractor's Surety, seven (7) days written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:
 - 1. Take possession of the site and of all materials, equipment, tools and construction equipment and machinery thereon owned by the Contractor;
 - 2. Accept assignment of subcontractors pursuant to this Contract for Construction (Contingent Assignment of Subcontracts to City if Contract is terminated); and,

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3. Finish the Work by whatever reasonable method the City may deem expedient.
- C. If the City terminates the Contract for one of the reasons stated in Termination by the City for Cause, the Contractor shall not be entitled to receive further payment until the Work is finished.
 - D. If the unpaid balance of the Contract Amount exceeds the cost of finishing the Work including expenses made necessary thereby, such excess shall be paid to the Contractor. If the costs of finishing the Work exceed the unpaid balance, the Contractor shall pay the difference to the City. The amount to be paid to the Contractor or City, as the case may be, shall survive termination of the Contract for Construction.

In the event of such termination, all monies due the Contractor or retained under the terms of this Contract shall be held by the City; however, such holdings will not release the Contractor or its sureties from liability for failure to fulfill the Contract. Any excess cost over and above the Contract Amount incurred by the City arising from the termination of the operations of the Contract and the completion of the Work by the City as provided above shall be paid for by any available funds held by the City. The Contractor will be so credited with any surplus remaining after all just claims for such completion have been paid.

If at any time before completion of the Work under the Contract, the Work shall be stopped by an injunction of a court of competent jurisdiction or by order of any competent authority, the City may give notice to the Contractor to discontinue the Work and terminate the Contract. The Contractor shall discontinue the Work in such manner, sequence, and at such times as the Construction Manager may direct. The Contractor shall have no claim for damages for such discontinuance or termination, nor any claim for anticipated profits on the Work thus dispensed with, nor for any claim for penalty, nor for any other claim such as unabsorbed overhead, except for the work actually performed up to the time of discontinuance, including any extra work ordered by the Construction Manager to be done.

GC 3.19 CITY'S RIGHT TO TERMINATE FOR CONVENIENCE

The City reserves the right to terminate this contract for convenience whenever it considers termination, in its sole and unfettered discretion, to be in the public interest. In the event that the Contract is terminated in this manner, payment will be made for work actually completed. In no event if termination occurs under this provision shall the Contractor be entitled to anticipated profits on items of work not performed as of the effective date of the termination or compensation for any other item, including but not limited to, unabsorbed overhead. The Contractor shall assure that all subcontracts which he/she enters related to this Contract likewise contain a termination for convenience clause which precludes the ability of any subcontractor to make claims against the Contractor for damages, due to breach of contract, of lost profit on items of work not performed or of unabsorbed overhead, in the event of a convenience termination.

GC 3.20 WORK DURING DISPUTES AND LITIGATION

In the event of a dispute between the parties hereto as to performance of the Work, the interpretation of this Contract, or payment or nonpayment for work performed, the parties shall attempt to resolve the dispute. If the dispute is not resolved, Contractor agrees to continue the Work diligently to completion and will neither rescind this Contract nor stop the progress of the Work but will submit such controversy to determination in accordance with the terms of the Contract Documents. In the event any litigation is commenced with respect to this Contract, such litigation shall not serve to suspend Contractor's obligation to continue performance of the Work hereunder.

GC 3.21 LANDS AND RIGHTS-OF-WAY

The lands and rights-of-way for the project to be constructed will be provided by the City. The Contractor shall make his/her own arrangements and pay all expenses for additional area required by him/her outside the limits of the City's land and right-of-way. Work in the public right-of-way shall be done in accordance with the requirements of the permit issued by the public agency in whose right-of-way the work is located in addition to conforming to the plans and specifications.

GC 3.22 WAIVER OF RIGHTS

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Except as otherwise specifically provided in the Contract Documents, no action or failure to act by the City, Owner's Representative, Construction Manager or Contractor shall constitute a waiver of any right or duty afforded any of them under the Contract Documents, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder.

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SECTION 4.0 SHOP DRAWINGS AND QUALITY CONTROL/INSPECTIONS

GC 4.1 CONTRACTOR'S RESPONSIBILITIES

The Contractor shall submit, at its own expense, submittals and details of structural and reinforcing steel, concrete mix designs, coatings, equipment, material, electrical controls, architectural fabrications, pipe, pipe joints, special pipe sections, and other appurtenances as required in the Technical Specifications and Special Conditions of the Contract Documents. The contract Unit Bid Price for the various items requiring submittals shall include the cost of furnishing all shop drawings, product data, and samples, and the Contractor will be allowed no extra compensation for such drawings, product data or samples.

All submittals and supporting drawings, designs, calculation, data, catalogs, schedules, etc., shall be submitted as the instruments of the Contractor, who shall be responsible for their accuracy, completeness, and coordination. Such responsibility shall not be delegated in whole or part to subcontractors or suppliers. These submittals may be prepared by the Contractor, subcontractors, or suppliers, but the Contractor shall ascertain that submittals meet all of the requirements of the Contract Documents while conforming to structural, space, and access conditions at the point of installation. Designation of work "by others," if shown in submittals, shall mean that the work will be the responsibility of the Contractor rather than the subcontractor or supplier who prepared the submittals. The Contractor shall insure that there is no conflict with other submittals and notify the Construction Manager in each case where its submittal may affect the work of another Contractor or the City. The Contractor shall insure coordination of submittals among the related crafts and subcontractors.

Submittals shall be prepared in such form that data can be identified with the applicable Specification paragraph. The data shall clearly demonstrate compliance with the Contract Drawings and specifications and shall relate to the specific equipment to be furnished. Where manufacturer's standard drawings are employed, they shall be marked clearly to show what portion of the data is applicable to this Project.

GC 4.2 SOURCE OF MATERIALS

Unless otherwise approved in writing by the Construction Manager, only unmanufactured materials produced in the United States, and only manufactured materials made in the United States, shall be used in the performance of this contract.

GC 4.3 TRANSMITTAL PROCEDURES

4.3.1 TRANSMITTAL FORM

A separate transmittal form shall be used for each specific item, class of material, equipment, and items specified in separate, discrete sections for which the submittal is required. Submittal documents common to more than one piece of equipment shall be identified with all the appropriate equipment numbers. Submittals for various items shall be made with a single form when the items taken together constitute a manufacturer's package or are so functionally related that expediency indicates checking or review of the group or package as a whole. The specification section to which the submittal is related shall be indicated on the transmittal form.

A unique number, sequentially assigned, shall be noted on the transmittal form accompanying each item submitted. Original submittal numbers shall have the following format: "XXX"; where "XXX" is the sequential number assigned by the Contractor. Resubmittals shall have the following format: "XXX-Y"; where "XXX" is the originally assigned submittal number and "Y" is a sequential letter assigned for resubmittals, i.e., A, B, or C being the 1st, 2nd, and 3rd resubmittals, respectively. Submittal 25B, for example, is the second resubmittal of submittal 25.

4.3.2 DEVIATIONS FROM THE CONTRACT

If the submittals show any deviations from the Contract requirements, the Contractor shall submit with the submittal submission a written description of such deviations and the reasons therefore. If the City accepts such deviation, the City shall issue an appropriate Contract Change Order, except that, if the deviation is minor, or does not involve a change in price or in time of performance, a Change Order may

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not be issued. If deviations from the Contract requirements are not noted on the submittal by the Contractor, the review of the shop drawing shall not constitute acceptance of such deviations.

4.3.3 SUBMITTAL COMPLETENESS

The Contractor shall check all submittals before submitting them to the Construction Manager and shall certify on the transmittal letter and on each shop drawing that they have been checked, are in compliance with the drawings and specifications, and all deviations from the Contract requirements are noted.

If the Contractor submits an incomplete submittal, the submittal may be returned to the Contractor without review. A complete submittal shall contain sufficient data to demonstrate that the items comply with the specifications, shall meet the minimum requirements for submissions cited in the Technical Specifications, shall include materials and equipment data and certifications where required, and shall include any necessary revisions required for equipment other than first named.

The City reserves the right to deduct monies from payments due the Contractor to cover additional actual costs of review beyond the second submission.

4.3.4 SUBMITTAL PERIOD

All submittals shall be submitted to the Construction Manager within fifteen (15) calendar days after the date of the Notice to Proceed by the City, unless the Construction Manager accepts an alternate schedule for submission of submittals proposed by the Contractor or unless provided for differently in the Special Conditions.

4.3.5 MATERIAL AND EQUIPMENT SUBSTITUTIONS

In preparing these specifications, the Design Consultant has named those products which to its knowledge meet the specifications and are equivalent in construction, functional efficiency, and durability.

Wherever catalog numbers and specific brands or trade names preceded by "similar and equal" or followed by the designation "or equal" are used in conjunction with a designated material, product, installation, or service mentioned in these specifications, they are used to establish the standards of quality and utility required. The Contractor may request, in writing, approval of any material, process or article which he/she believes to be equal. The written request shall state how the material, process, or article proposed for substitution compares with or differs from the designated material, process, or article in composition, size, arrangement, performance, and in addition, the request shall be accompanied by documentary evidence of equality in price and delivery or evidence of difference in price and delivery. Data on price shall be in the form of certified quotations from suppliers of both the designated and proposed material, process or article. If any material, process or article offered by the Contractor is not, in the opinion of the Engineer, equal or better in every respect to that specified, then the Contractor must furnish the material, process or article specified or one that, in the opinion of the Engineer, is the equal or better in every respect. In the event the Contractor furnishes material, process, or article more expensive than that specified, the difference in cost of such material, process, or article so furnished shall be borne by the Contractor. Pursuant to NRS, Chapter 338.140, data substantiating a request for substitution of "an equal" item shall be submitted within seven (7) days after Award of the Contract.

GC 4.4 REVIEW PROCEDURE

Submittals shall be submitted to the Construction Manager for review and will be returned to the Contractor within fifteen (15) working days after receipt, unless otherwise provided for in the Special Conditions. The primary objective of review of submittals by the City is the completion of the Project in full conformance with the Contract, unmarred by field corrections, and within the time provided. In addition to this primary objective, submittal review as a secondary objective will assist the Contractor in its procurement of equipment that will meet all requirements of the Project Drawings and specifications, will fit the structures detailed on the drawings, will be completed with respect to piping, electrical, and control connections, will have the proper functional characteristics, and will become an integral part of a complete operating facility.

After review by the City of each of the Contractor's submissions, the material will be returned to the Contractor with actions defined as follows:

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- A. **No Exceptions Noted (Resubmittal Not Required)**
Accepted subject to its compatibility with future submissions and additional partial submissions for portions of the work not covered in this submission. Does not constitute approval or deletion of specified or required items not shown in the partial submission.
- B. **Make Corrections Noted (Resubmittal Not Required)**
Same as A, except that minor corrections as noted shall be made by the Contractor.
- C. **Make Corrections Noted (Resubmittal)**
Rejected because of inconsistencies or errors which shall be resolved or corrected by the Contractor prior to subsequent review by the City.
- D. **Not Acceptable (Resubmit)**
Submitted material does not conform to drawings and specifications in major respects, i.e.: wrong size, model, capacity, or material.

It shall be the Contractor's responsibility to copy and/or conform reviewed submittals in sufficient numbers for its files, subcontractors, and vendors.

The Contractor shall submit a minimum of six (6) copies for each submittal. The Construction Manager will retain a minimum of four (4) copies for its use and record and return two (2) copies to the Contractor.

The City's favorable review of submittals shall be obtained prior to the fabrication, delivery and construction of items requiring submittal review.

Favorable review of submittals does not constitute a change order to the Contract requirements. The favorable review of all submittals by the City shall apply in general design only and shall in no way relieve the Contractor from responsibility for errors or omissions contained therein. Favorable review by the City shall not relieve the Contractor of its obligation to meet safety requirements and all other requirements of law. Favorable review by the City shall not constitute acceptance by the City of any responsibility for the accuracy, coordination, and completeness of any items or equipment represented on the submittals.

GC 4.5 QUALITY CONTROL - GENERAL

All materials and equipment to be incorporated into the Work, unless otherwise specified, shall be new and of the specified quality and equal to the samples found to be acceptable by the Design Consultant if samples have been submitted. All materials, equipment, and supplies provided shall, without additional charge to the City, fully conform with all applicable state and federal safety laws, rules, regulations, and orders, and it shall be the Contractor's responsibility to provide only such materials, equipment, and supplies. It shall be the duty of the Contractor to call the Construction Manager's attention to apparent errors or omissions and request instructions before proceeding with the Work. The Construction Manager may, by appropriate instructions, correct errors and supply omissions not involving extra cost, which instructions shall be as binding upon the Contractor as though contained in the original Contract Documents.

At the option of the Construction Manager, materials and equipment to be supplied under this Contract will be tested and inspected either at their place of origin, laboratory, or at the site of the Work. The Contractor shall give the Construction Manager written notification at least 30 days prior to the shipment of materials and major equipment to be tested and inspected at point of origin. Prior to shipping any precast concrete products, a meeting shall be held at the manufacturer's site to discuss and agree on uniform acceptability standards for the precast products. Satisfactory tests and inspections at the point of origin shall not be construed as a final acceptance of the materials and equipment, nor shall such tests and inspections preclude retesting or re-inspection at the site of the Work.

Inspection of the Work by the City, Construction Manager and/or Design Consultant shall not relieve the Contractor of its obligations to conduct comprehensive inspections of the Work, to furnish materials and perform acceptable Work, and to provide adequate safety precautions in conformance with the intent of the Contract.

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4.5.1 QUALITY ASSURANCE INSPECTION

All work and materials are subject to the inspection of the Construction Manager. The Contractor shall prosecute work only in the presence of the Construction Manager or a City inspector appointed by the Construction Manager, and any work done in the absence of said Construction Manager or inspector may be subject to rejection. Furthermore, failure to call for the Construction Manager or inspector to inspect as the work progresses shall be considered as a major breach of the Contract and may constitute grounds for the City to terminate. The Contractor shall make a request to the Construction Manager or inspector at least twenty-four (24) hours in advance before inspection services are required for the work. If the specifications, the Construction Manager's instructions, laws, ordinances, or any public authority require any work to be specially tested or approved, the Contractor shall give timely notice of its readiness for inspection. The City, Construction Manager, Design Consultant and authorized agents and their representatives shall at all times be provided safe access to the Work wherever it is in preparation or progress and to all warehouses and storage yards wherein materials and equipment are stored, and the Contractor shall provide facilities for such access and for inspection, including maintenance of temporary and permanent access. Inspection of the Work shall not relieve the Contractor of the obligation to fulfill all conditions of the Contract, and improper work will be subject to rejection. Work and materials not meeting such requirements shall be made good, and unsuitable work or materials may be rejected; notwithstanding that such work or materials have been previously inspected by the Construction Manager or that payment therefore has been included in a progress estimate.

No work or any portion thereof shall be deemed acceptable by reason of the presence of the Engineer. While the Engineer will endeavor to point out to the Contractor any defective work which comes to the Engineer's attention during these observations, the Engineer's failure to do so shall not constitute the basis of any claim, suit, or cause of action by the Contractor or any party against the Engineer or City and shall not excuse nonconforming or defective work by the Contractor.

No portion of any work or installed materials shall be covered or concealed in any manner without first being inspected by the Construction Manager. If any work should be covered up without the approval or consent of the Construction Manager, the Construction Manager shall have the authority to require, at any time before acceptance of the Work, that such work be uncovered for examination. After examination, the Contractor shall restore said portions of the Work to the standards required by the Specifications. Should the work thus exposed or examined prove acceptable, the uncovering or removing of the covering and the replacing of the covering or making good of the parts removed, will be paid for as provided in GC 6.0, CHANGE ORDERS, but should the work so exposed or examined prove unacceptable, the uncovering or removing and the replacing of the covering or making good of the parts removed shall be at the Contractor's expense.

4.5.2 PERMIT AND CODE COMPLIANCE INSPECTIONS

Separate and independent from the inspections above, the Work may require the inspections of Building Officials or other agencies. The Contractor shall make arrangements with the Carson City Building Department to schedule appropriate Building Permit compliance inspections and with other agencies (i.e. Fire Officials, NDOT, NDEP, etc.) to schedule their required permit and code inspections. Such inspectors shall have the authority provided them by their agencies and jurisdictions.

4.5.3 SAMPLES AND TESTS

The source of supply of materials for the Work shall be subject to tests and inspection before the delivery is started and before such materials are used in the Work. Representative preliminary samples of the character and quality prescribed shall be submitted to the Construction Manager by the Contractor in sufficient quantities or amounts for testing or examination.

All tests of materials furnished by the Contractor shall be made in accordance with the commonly recognized standards of national technical organizations, and such special methods and tests as are prescribed in the Technical Specifications. Certificates of Compliance shall be provided by the Contractor as required in the Technical Specifications.

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A. Sampling

The Contractor shall furnish such samples of materials as are requested by the Construction Manager. No material shall be used until the Construction Manager has had the opportunity to test or examine such materials. Samples shall be secured and tested whenever necessary to determine the quality of the material. Samples and test specimens prepared at the site, such as concrete test cylinders, shall be taken or prepared by the Construction Manager in the presence and with the assistance of the Contractor.

B. Testing

All initial testing including, but not limited to, concrete, soils, and asphalt/concrete pavement shall be at no expense to the Contractor and shall be performed in the City's laboratory or in a laboratory designated by the City. When required by the Contract or the Construction Manager, the Contractor shall furnish certificates of tests of materials and equipment made at the point of manufacture by a recognized testing laboratory.

The Contractor is responsible for all system and equipment testing as provided for in these Contract Documents.

C. Retesting Costs

The costs of any retesting required due to failed test or defective material or sample shall be at the Contractor's expense. The City will deduct such retesting costs from the progress payments through a deductive change order.

D. Test Standards

All sampling, specimen preparation, and testing of materials shall be in accordance with the requirements of the Standard Specifications, or any permits, and the standards of nationally recognized technical organizations. The physical characteristics of all materials not particularly specified shall conform to the latest standards published by the American Society for Testing Materials, where applicable.

E. Testing Disputes

In the event that the Contractor disputes the results of the City's materials testing and retains his/her own testing laboratory for comparison testing, only a laboratory and personnel certified under the Nevada Alliance for Quality Transportation Construction (NAQTC) will be considered.

GENERAL CONDITIONS

SECTION 5.0 PAYMENT

GC 5.1 GENERAL

The Contractor shall accept the compensation, as herein provided, as full payment for furnishing all labor, materials, tools, equipment, and incidentals appurtenant to the various items of the Proposal Summary, as further specified herein, necessary for completing the Work, all in accordance with the requirements of the Contract Documents, including all costs of permits and compliance with the regulations of the Occupational Safety and Health Administration of the U. S. Department of Labor (OSHA), and no additional compensation will be allowed therefore. No separate payment will be made for any item that is not specifically set forth in the Proposal Summary, and all costs therefore shall be included in the prices named in the Proposal Summary for the various items of Work. Prior to the City processing the pay estimate, if prevailing wage rates are required, the Contractor shall submit to the City a copy of its certified payroll reports for each week within the pay estimate period.

GC 5.2 PAYMENT FOR PATENTS AND PATENT INFRINGEMENT

All fees or claims for any patented invention, article, or arrangement that may be used upon or in the work, or is in any manner connected with the performance of the Work, shall be included in the price bid for doing the work. The Contractor and its sureties shall defend, protect, and hold the City, the Construction Manager, and Design Consultant, and their officers, agents, employees, and volunteers harmless against liability of any nature or kind for any and all costs, legal expenses, and damages made for such fees or claims and against any and all suits and claims brought or made by the holder of any invention or patent, or on account of any patented or unpatented invention, process, article, or appliance manufactured for or used in the performance of the Contract, including its use by the City. Before final payment is made on the Contract, the Contractor shall furnish an affidavit to the City regarding patent rights for the Project. The affidavit shall state that all fees and payments due as a result of the Work incorporated into the Project or methods utilized during construction have been paid in full. The Contractor shall certify in the affidavit that no other fees or claims exist in this Project.

GC 5.3 PAYMENT OF TAXES

The Contractor shall pay and shall assume exclusive liability for all taxes levied or assessed on or in connection with the Contractor's performance of this Contract, including, but not limited to, state and local sales and use taxes, federal and state payroll taxes or assessments, and excise taxes. No separate allowance will be made therefore, and all costs in connection therewith shall be included in the total amount of the Contract Amount.

GC 5.4 PAYMENT FOR LABOR AND MATERIALS

In accordance with the provision of NRS 338.550, the Contractor shall pay and require its subcontractors to pay all accounts for labor including workers' compensation premiums, state unemployment and federal social security payments and other wage and salary deductions required by law. The Contractor also shall pay and cause its subcontractors to pay all accounts for services, equipment, and materials used by the Contractor and its subcontractors during the performance of Work under this Contract. Such accounts shall be paid as they become due and payable.

GC 5.5 PARTIAL PAYMENTS

In consideration of the faithful performance of the Work prosecuted in accordance with the provisions of the Contract Documents, the City will pay the Contractor for all such work installed on the basis of percentage completion. Amounts earned will be based on the accepted Schedule of Values.

Payments will be made by the City to the Contractor on estimates approved by the Construction Manager, based on the value of equipment installed and tested, labor and materials incorporated into said permanent Work by the Contractor during the preceding month, and acceptable materials and equipment on hand (materials and equipment furnished and delivered to the site by the Contractor and not yet incorporated into the work accompanied by an approved paid invoice) per GC 5.5.1, below.

Partial payments will be made monthly based on work accomplished as of the last day of each calendar month.

The Contractor and Construction Manager shall meet within five (5) days after the end of each calendar month to review and agree on the Work completed within the past month. The Contractor shall then submit its progress

GENERAL CONDITIONS

billing of the Work completed during the prior month and the Work completed to date on the City's approved form corresponding to the accepted Schedule of Values. Upon receipt of Contractor's progress billing, the City shall act in accordance with the following:

- a. The Construction Manager shall review the submitted progress billing to verify that it corresponds with the agreement reached at the above mentioned review meeting. If the progress billing is satisfactory, the Construction Manager will process it for payment.
- b. If the Construction Manager determines that the progress billing is not satisfactory, then pursuant to NRS 338.525, the City shall, within twenty (20) days of receipt of said progress billing, give written notification to the Contractor of any amount that will be withheld and a detailed explanation of the reason for the withholding. The remainder will be processed for payment.

If requested, the Contractor shall provide such additional data as may be reasonably required to support the partial payment request. Payment will be made by the City to the Contractor in accordance with City's normal accounts payable procedures. The City shall retain amounts in accordance with Sections GC 5.6, RETENTION, and GC 5.7, OTHER WITHHOLDS.

Per NRS 338.515, the City shall pay the Contractor within thirty (30) days after receipt of its progress billing.

5.5.1 PARTIAL PAYMENTS - INCLUSION OF MATERIALS ON HAND

Except as otherwise provided in NRS 338.515(1), GC 5.6 "RETENTION", NRS 338.525, and GC 5.7 "OTHER WITHHOLDS", pursuant to NRS 338.515(2), the City will pay or cause to be paid to the Contractor the actual cost of the supplies, materials and equipment that have been identified in the Special Conditions as eligible for such payment. To be eligible for such payment the supplies, materials, or equipment must:

- (A) be identified in the Special Conditions:
- (B) have been delivered and stored at a location, and in the time and manner, specified in this Contract by the Contractor or a subcontractor or supplier for use in the Work; and,
- (C) be in short supply or were made specifically for this Contract.

Materials, as used herein, shall be considered to be those items which are fabricated and manufactured goods and equipment. Only those materials for which the Contractor can transfer clear title to the City will be qualified for partial payment.

To receive payment for materials and equipment delivered to the site, but not incorporated in the Work, it shall be necessary for the Contractor to submit to the Construction Manager a list of such materials at least seven (7) days prior to submitting the monthly progress billing for work completed. At the Construction Manager's discretion, the Construction Manager will approve items for which partial payment is to be made subject to the following:

- a. Only equipment or materials which have received favorable review of shop drawings will qualify.
- b. Eligible equipment or materials must be delivered and properly stored, protected, and maintained at the job site in a manner favorably reviewed by the Construction Manager.
- c. The Contractor's actual net cost for the materials must be supported by paid invoices of suppliers or other documentation requested by the Construction Manager.

GC 5.6 RETENTION

From each progress payment estimate, ten (10) percent of the "total completed to date" sum will be deducted and retained by the City, and the remainder, less the amount of all previous payment, will be paid to the Contractor. After fifty (50) percent of the Work has been completed and if progress on the Work remaining is satisfactory, the

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deduction to be made from the remaining progress payments and from the final payment may be reduced to five (5) percent of the adjusted Contract Price at the discretion of the City.

GC 5.7 OTHER WITHHOLDS

In addition to the amount which the City may otherwise retain under the Contract, the City may withhold a sufficient amount of any payment otherwise due the Contractor, as in its judgment may be necessary to cover:

- a. Defective work not remedied;
- b. A reasonable doubt that the Contract can be completed for the balance then unpaid;
- c. Damage to another contractor, third party, or to property;
- d. Failure to submit, revise, resubmit, or otherwise conform to the requirements herein for preparing and maintaining a construction schedule;
- e. Failure of the Contractor to keep the Work progressing in accordance with its Progress Schedule;
- f. Failure to maintain current "As-Built" record drawings;
- g. Failure of the Contractor to make proper submissions, as herein specified;
- h. Payments due the City from the Contractor;
- i. Reduction of Contract Amount because of modifications; or
- j. The Contractor's neglect or unsatisfactory prosecution of the Work, including failure to clean up.

When the above reasons for withhold amounts are removed, payment will be made to the Contractor for amounts withheld.

GENERAL CONDITIONS

SECTION 6.0 CHANGE ORDERS

GC 6.1 GENERAL

Without invalidating the Contract and without notice to sureties or insurers, the City through the Construction Manager, may at any time order additions, deletions, or revisions in the Work. These will be authorized by Work Directive, Field Order, or Change Order. A Change Order will not be issued for a Work Directive unless the Construction Manager concurs with an appeal by the Contractor that such Work Directive is a change in the scope of the Contract. The Contractor shall comply promptly with the requirements of all Change Orders, Field Orders, or Work Directives. The work involved in Change Orders shall be executed under the applicable conditions and requirements of the Contract Documents. If any Field Order or Work Directive causes an increase or decrease in the Contract Amount or an extension or shortening of the Contract Time, an equitable adjustment will be made by issuing a Change Order. If the Contractor accepts a Change Order that does not include a time extension, the Contractor waives any claim for additional time for the work covered by that Change Order. Additional or extra work performed by the Contractor without written authorization of a Work Directive, Field Order or Change Order will not entitle the Contractor to an increase in the Contract Amount or an extension of the Contract Time.

Extra work shall be that work neither shown on the Contract Drawings nor specified. Such work shall be governed by all applicable provisions of the Contract Documents. In giving instructions, the Construction Manager shall have authority to make minor changes in the Work, not involving extra cost, or extra time, and not inconsistent with the intent of the Work. With the exception of an emergency which would endanger life or property, no extra work or change shall be made unless in pursuance of a written order by the City through the Construction Manager, and no claim for an addition to the total amount or total time of the Contract shall be valid unless so ordered in writing.

In case any change increases or decreases the Work shown, the Contractor shall be paid for the work actually done at a mutually agreed upon adjustment to the Contract Amount.

If the Contractor refuses to accept a Change Order, the City may issue it unilaterally. The Contractor shall comply with the requirements of the Change Order. The City shall provide for an equitable adjustment to the Contract, and compensate the Contractor accordingly. If the Contractor does not agree that the adjustment is equitable, it may submit a claim in accordance with the requirements herein stated.

GC 6.2 DIFFERING SITE CONDITIONS

The Contractor shall promptly, and before such conditions are disturbed, notify the Construction Manager in writing, of any:

- a. Material that the Contractor believes may be hazardous waste that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of law.
- b. Subsurface or latent physical conditions at the site differing from those indicated.
- c. Unknown physical conditions at the site of any unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract.

The Construction Manager shall promptly investigate the conditions, and if it finds that the conditions do materially differ, or do involve hazardous waste, and cause an increase or decrease in the Contractor's cost of, or the time required for performance of any part of the Work, the City shall cause to be issued a change order under the procedures provided herein.

In the event that a dispute arises between the City and the Contractor whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the Contractor's cost of, or time required for, performance of any part of the Work, the Contractor shall not be excused from any scheduled completion date provided for by the Contract, but shall proceed with all Work to be performed under the Contract. The Contractor

GENERAL CONDITIONS

shall retain any and all rights provided either by Contract or by law which pertain to the resolution of disputes and protests between the parties.

No claim of the Contractor under this clause shall be allowed unless the Contractor has given the notice required.

GC 6.3 RESOLUTION OF DISPUTES

6.3.1 CONTRACT INTERPRETATION BY THE CONSTRUCTION MANAGER

Questions regarding the meaning and intent of the Contract Documents shall be referred in writing by the Contractor to the Construction Manager. Where practical, the Construction Manager shall respond to the Contractor in writing with a decision within seven (7) working days of receipt of the request.

6.3.2 CLAIMS

A. Notice

If the Contractor disagrees with the Construction Manager's decision, or in any case where the Contractor deems additional compensation or a time extension to the Contract period is due the Contractor for work or materials not covered in the Contract or which the Construction Manager has not recognized as extra work, the Contractor shall notify the Construction Manager, in writing, of its intention to make claim. Claims pertaining to decisions based on Contract interpretation or such other determinations by the Construction Manager shall be filed in writing to the Construction Manager within five (5) days of receipt of such decision. All other claims or notices for extra work shall be filed in writing to the Construction Manager prior to the commencement of such work. Written notice shall use the words "Notice of Potential Claim". Such Notice of Potential Claim shall state the circumstances and all reasons for the claim, but need not state the amount.

It is agreed that unless notice is properly given, the Contractor shall not recover costs incurred by it as a result of the alleged extra work, changed work or other situation which, had proper notice been given, would have given rise to a right for additional compensation. The Contractor should understand that timely Notice of Potential Claim is of great importance to the Construction Manager and City, and is not merely a formality. Such notice allows the City to consider preventative action, to monitor the Contractor's increased costs resulting from the situation, to marshal facts, and to plan its affairs. Such notice by the Contractor, and the fact that the Construction Manager has kept account of the cost as aforesaid, shall not in any way be construed as proving the validity of the claim.

B. Records of Disputed Work

In proceeding with a disputed portion of the Work, the Contractor shall keep accurate and complete records of its costs and shall make available to the Construction Manager a daily summary of the hours and classifications of equipment and labor utilized on the disputed work, as well as a summary of any materials or any specialized services which are used which shall be signed by the Construction Manager and Contractor daily. Such information shall be submitted to the Construction Manager on a weekly or daily basis as determined by the Construction Manager, receipt of which shall not be construed as an authorization for or acceptance of the disputed work.

C. Submission of Claim Costs

Within thirty (30) days after the last cost of work for which the Contractor contends it is due additional compensation is incurred, but if costs are incurred over a span of more than thirty (30) days, then within fifteen (15) days after the thirtieth day and every month thereafter, the Contractor shall submit to the Construction Manager, as best the Contractor is able, its costs incurred for the claimed matter. Claims shall be made in itemized detail. Should the Construction Manager be dissatisfied with format or detail of presentation, and upon request for more or different information, the Contractor will promptly comply to the satisfaction of the Construction Manager. If the additional costs are in any respect not known with certainty, they shall be estimated as best as can be done. In case the claim is found to be just, it shall be allowed and

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paid for as provided in GC 6.4, MODIFICATION PROCEDURES and GC 5.5, PARTIAL PAYMENTS.

D. Claim Meetings

The Construction Manager may call special meetings to discuss outstanding claims. The Contractor shall cooperate and attend such meetings prepared to discuss its claims, making available the personnel necessary for resolution, and all documents which may reasonably be requested by the Construction Manager.

GC 6.4 MODIFICATION PROCEDURES

6.4.1 CHANGES IN CONTRACT PRICE

Whenever corrections, alterations, or modifications of the Work under this Contract are ordered by the Construction Manager, approved by the City, and increase the amount of work to be done, such added work shall be known as extra work. When such corrections, alterations, or modifications decrease the amount of work to be done, such subtracted work shall be known as work omitted.

The difference in cost of the work affected by such change will be added to or deducted from the amount of said Contract Amount, as the case may be, by a fair and reasonable valuation, which shall be determined in one or more of the following ways as directed by the Construction Manager:

- a. By unit prices accepted by the City and stated in the Contract Documents or Schedule of Values;
- b. By unit prices subsequently fixed by agreement between the parties;
- c. By an acceptable lump sum proposal from the Contractor; or
- d. By Force Account (as described in GC 6.4.3, Force Account Payment, when directed and administered by the City or Construction Manager.

When required by the Construction Manager, the Contractor shall submit, in the form prescribed by the Construction Manager, an itemized breakdown with supporting data of the quantities and prices used in computing the value of any change that may be ordered.

The Construction Manager will review the Contractor's proposal for the change and negotiate an equitable adjustment with the Contractor. When there is an agreement, the Construction Manager will prepare and process the Change Order and make a recommendation for action by the City. All Change Orders must be signed by the Contractor and approved by the City unless unilaterally issued per GC 6.1, above.

The prices agreed upon and any agreed upon adjustment in Contract Time shall be incorporated in the written order issued by the City, which shall be written so as to indicate an acceptance on the part of the Contractor as evidenced by its signature. By signature of the Change Order, the Contractor acknowledges that the adjustments to cost and time contained in the Change Order are in full satisfaction and accord, payment in full, and so waives any right to claim any further cost and time impacts at any time during and after completion of the Contract for the changes encompassed by the Change Order.

When any Extra Work is performed by a Subcontractor, the markups established in GC 6.4.2 and GC 6.4.3 shall be applied to the Subcontractor's costs as determined under GC 6.4.2 and GC 6.4.3. The Contractor's markup on subcontracted work shall be limited to five percent (5%) of the total of the Subcontractor's costs, which amount shall constitute the markup for all overhead and profit for the Contractor on work by the Subcontractor. On any item(s) of Extra Work, there shall only be one markup allowed to the Subcontractor even if there are multiple tiers of subcontractors, and only one markup allowed to the Contractor for subcontracted work.

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6.4.2 NEGOTIATED CHANGE ORDERS

Under the methods described in GC 6.4.1.b and 6.4.1.c above, the Contractor shall submit substantiating documentation with an itemized breakdown of Contractor and subcontractor direct costs, including labor, material, equipment, rentals, and approved services pertaining to such ordered work in the form and detail acceptable to the Construction Manager. The direct costs shall include only the payroll cost for workers and foremen including wages, fringe benefits as established by negotiated labor agreements or state prevailing wages, workers' compensation and labor insurance, and labor taxes as established by law. No other fixed labor burdens will be considered. The cost of materials used and equipment delivered and installed in the Work shall be as substantiated by appropriate documents. The cost of construction machinery and equipment shall be based on fair rental or ownership values acceptable to the Construction Manager as described in GC 6.4.3, Force Account Payment, and the cost of incidentals directly related to such work. The direct costs shall not include any labor or office costs pertaining to the Contractor's managers or superintendents, its office and office facilities, or anyone not directly employed on such work, nor the cost of small tools, as all such indirect costs form a part of the Contractor's overhead expense.

Under the method described in GC 6.4.1.b and 6.4.1.c, the maximum percentage which will be allowed for the Contractor's combined overhead and profit will be:

Direct Labor	fifteen percent (15%)
Materials	fifteen percent (15%)
Equipment (owned or rented)	fifteen percent (15%)

The above fees represent the maximum limits which will be allowed, and they include the Contractor's indirect home office expenses and all costs for cost proposal preparation.

The amount of credit to be allowed by the Contractor to the City for any such change which results in a decrease in cost will be the amount of the actual net decrease plus a credit in accordance with the markups allowed above.

The Contractor shall not claim for anticipated profits on work that may be omitted unless the deleted amount of work is determined to constitute a cardinal change to the Project.

6.4.3 FORCE ACCOUNT PAYMENT

If either the amount of Work or payment for a Change Order cannot be determined or agreed upon beforehand, the City may direct by written Change Order, Work Directive, or Field Order that the Work be done on a force account basis. The term "force account" shall be understood to mean that payment for the Work will be done on a time and expense basis, that is, on an accounting of the Contractor's forces, materials, equipment, and other items of cost as required and actually used to do the work. In order to have a valid claim for Force Account payment, the Contractor must submit on a daily basis the City's Daily Extra Work Report signed by both the Contractor's representative and the City's Construction Manager or inspector. For the work performed, payment will be made for the documented actual cost of the following:

- a. Direct labor cost for workers, including foremen, who are directly assigned to the force account Work. Direct labor cost is the actual payroll cost including wages, fringe benefits as established by negotiated labor agreements or state prevailing wages, workers' compensation and labor insurance, and labor taxes as established by law. No other fixed labor burdens will be considered.
- b. Material delivered and used on the designated work, including sales tax, if paid for by the Contractor or its subcontractor. Material wasted or disposed of in a manor not called for under the contract, material not unloaded from the transporting vehicle, material placed outside the limits indicated or given plans; or material remaining on hand after completion of the work will not be paid for except as otherwise provided.

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- a. Equipment rental: For any machinery or equipment, the use of which has been authorized by the Construction Manager, the Contractor will be paid for the use of such machinery or equipment in the manner hereinafter specified, regardless of ownership and any rental or other agreement, if such may exist, for the use of such equipment entered into by the contractor.

Rental rates will be determined as follows:

- 1.1 The base rates shall be those established in publications and revisions thereto entitled "Rental Rate Blue Book for Construction Equipment" or the "Rental Rate Blue Book for Older Construction Equipment" available from Equipment Watch, 1735 Technology Drive, Suite 410, San Jose, CA 95110-1313, phone (408) 467-6700.

The hourly rate to be paid shall be the monthly rate divided by 176, multiplied by the regional adjustment factor, and multiplied by the appropriate rate adjustment factor, then plus the estimated operating cost per hour shown therein, and then rounded to the nearest \$0.10.

2. Attachments (e.g. tractor with ripper and dozer or tractor with loader and backhoe) will be included in the hourly rental rate only when deemed essential to the work as determined by the Construction Manager. When multiple attachments are approved for use and are being used interchangeably, the attachment having the highest rental rate shall be the only one included for payment.
3. No direct payment will be made for necessary accessories (including replenishing blades, augers, teeth, hoses, bits, etc.) if not listed in the Rental Rate Blue Book.
4. No compensation will be allowed for shop tools having a daily rental rate of less than \$10 as set forth in Section 18 of the Rental Rate Book.

If ordered to use equipment not listed in the aforementioned publications, a suitable rental rate for such equipment will be established. Contractor shall furnish any cost data which might assist in the establishment of such rental rate.

Except as provided below, payment will be made for the actual time that such equipment is in operation on the work. Time will be measured in 0.5 hours increments of actual working time and necessary traveling time of the equipment within the limits of the project.

Authorized standby time for idle equipment will be paid for at 50% of the "monthly rate divided by 176, multiplied by the regional adjustment factor, and multiplied by the rate adjustment factor", and rounded to the nearest \$0.10. No operating cost, markup, overhead or profit will be added.

The rental rates paid as above provided shall include the cost of fuel, oil, lubrication, supplies, small tools, necessary attachments, repairs and maintenance of any kind, depreciating, storage, insurance and all incidentals.

When special equipment has been ordered in connection with force account work, travel time and transportation to the project will be measured as hereinafter outlined. For the use of special equipment moved in on the work and used exclusively for extra work paid for on a force account basis, the rental rates as determined above and the cost of transporting the equipment to the location of the work and its return to its original location will be paid, all according to the following provisions:

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- (a) The original location of the equipment to be hauled to the location of the work will be agreed to in advance.
- (b) The City will pay the costs of loading and unloading such equipment.
- (c) The cost of transporting equipment on low bed trailers shall not exceed the hourly rates charged by established haulers.
- (d) The rental period shall begin at the time the equipment is unloaded at the site of the extra work, shall include each day that the equipment is at the site of the extra work, excluding Saturdays, Sundays and legal holidays unless the extra work is performed on such days, and shall terminate at the end of the day on which the Construction Manager directs the Contractor to discontinue the use of such equipment.
- (e) Should the Contractor desire the return of the equipment to a location other than its original location, the City will pay the cost of transportation by the above provisions, provided such payment shall not exceed the cost of moving the equipment to the work.
- (f) Payment for transporting and loading and unloading equipment as above provided will not be made if the equipment is used on the work in any other way than upon extra work paid for on a force account basis. _

To the preceding costs, there shall be added the following fees as the combined overhead and profit for the Contractor:

- a. A fixed fee not-to-exceed fifteen (15) percent of the costs of Item a, labor, above.
- b. A fixed fee not-to-exceed fifteen (15) percent of the costs of Item b, materials, above.
- c. A fixed fee not-to-exceed fifteen (15) percent of the costs of Item c, equipment, above.

The added fixed fees shall be considered to be full compensation covering the cost of general supervision, overhead, profit, and all other expenses. The above fixed fees represent the maximum limits which will be allowed, and they include the Contractor's indirect home office expenses and all costs for cost proposal preparation and record keeping.

6.4.4 UNIT PRICE ADJUSTMENTS DUE TO INCREASED OR DECREASED QUANTITIES

The unit prices as stated in the Bid and as negotiated in Change Orders shall apply to one hundred (100) percent of the quantity indicated to be estimated quantity for the Bid item, plus or minus twenty-five (25) percent. Either party to the Contract will be entitled to an equitable adjustment in unit prices for that portion of the actual quantity less than seventy-five (75) percent or more than one hundred twenty-five (125) percent of the original Bid quantity. Such equitable adjustment shall be determined in one or more of the following ways:

- A. If the parties are able to agree, the price will be determined by using:
 - 1. Unit prices; or
 - 2. Other agreed upon prices.
- B. If the parties cannot agree, the price will be determined by the Engineer using:
 - 1. Unit prices, or
 - 2. Other means to establish costs.

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The following limitations shall apply in determining the amount of the equitable adjustment:

- A. No claim for loss of anticipated profits on deleted or uncompleted work or consequential damages of any kind will be allowed.
- B. If the actual quantity of work performed is less than seventy-five (75) percent of the original Bid quantity, the total payment for the item will be limited to not more than seventy-five (75) percent of the amount originally Bid.
- C. No payment will be made for extended or unabsorbed home office overhead and field overhead expenses to the extent that there is an unbalanced allocation of such expenses among the contract Bid items.
- D. No adjustment in the unit contract bid price will be made for any item unless the increase or decrease in quantity results in a change of \$10,000 or more as measured by the original bid quantity and unit price for the item.

The City will not adjust for increases or decreases if the City has entered the amount for the Bid item in the proposal form only to provide a common basis for bidders.

6.4.5 TIME EXTENSIONS FOR CHANGE ORDERS

If the Contractor requests a time extension for the extra work necessitated by a proposed Change Order, the request must be accompanied by a time impact analysis, based on the latest Construction Schedule update, or other method acceptable to the Construction Manager.

GC 6.5 DISPUTES

Any dispute relating to this Contract after award shall be resolved through good faith efforts by the Contractor and City. The Contractor shall have the right to appeal any decision by any inspector to the Construction Manager; and, by the Construction Manager to the Owner's Representative. Initial notice of any dispute must be filed with the Construction Manager per GC 6.3.2.A, Claims - Notice.

If the Contractor considers the determination of the Construction Manager to be unfair he/she shall, within ten (10) days after receipt of the Construction Managers decision, file a written protest with the Owner's Representative stating clearly and in detail his/her objections and the reasons therefore. The Owner's Representative shall review the issue in dispute and shall promptly advise the Contractor in writing of his/her final decision. At all times, the Contractor shall carry on the Work and maintain its Construction Schedule in accordance with the requirements of the Contract and the determination of the City, pending resolution of any dispute.

If review by the Owner's Representative does not result in a resolution of the dispute, the parties shall proceed to non-binding mediation. Non-binding mediation shall be conducted under the auspices of the American Arbitration Association acting under its Construction Industry Mediation Procedures. Mediation conducted in accordance with this provision shall take place in Carson City, Nevada. Mediation shall be conducted by a single mediator, approved by both the City and the Contractor from a list provided by the American Arbitration Association. Each party shall pay one-half of the mediator's compensation and the administration fees. Each party shall bear its own expenses associated with the mediation, including but not limited to its own attorney and expert consultant fees. Each party shall have at least one individual attend the mediation proceeding who has full authority to settle the dispute on their behalf, provided however, that any agreement reached will have to be put before the Carson City Board of Supervisors or Carson City Regional Transportation Commission for final approval.

GC 6.6 ARBITRATION

Any controversy or claim arising out of or relating to the performance of these Contract Documents, which cannot be resolved by mutual agreement or mediation, shall be submitted to binding arbitration by the claiming party by filing a Notice of Intent to Arbitrate (demand) within fifteen (15) days of the conclusion of mediation, specified above in GC 6.5, DISPUTES, with the other party and three (3) copies to the American Arbitration Association or the Nevada Arbitration Association. Either party to the Contract Documents may request that any dispute or difference be arbitrated by filing a demand to arbitrate. Said demand shall contain a statement of the disputes,

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the amount involved, if any, and the remedy sought. Through written mutual consent, the parties may agree to combine all disputes for a single arbitration proceeding during or after substantial completion of the Project. Such arbitration shall be conducted in accordance with the Construction Industry Arbitration Rules (which can be found at www.adr.org) administered by the American Arbitration Association or the Nevada Arbitration Association. Failure to give such notice in the time specified shall preclude the party desiring arbitration from subsequently arbitrating that particular claim, dispute, or other matter. Judgment on the award rendered by the arbitrators may be entered in the First Judicial District Court of the State of Nevada.

In the event that any controversy or claim arising out of or relating to the performance of this Contract becomes the subject of arbitration, Carson City shall have the right to join or bring an additional party to the arbitration proceeding, and the Contractor hereby irrevocably consents and agrees to such joinder.

In the event that Carson City is named as a party to any arbitration action arising out of, or resulting from the design or construction of the Project, the Contractor hereby agrees, at the request of Carson City, to be joined as a party to that arbitration proceeding and to be bound by any decision resulting from arbitration.

In the event of arbitration, it is agreed by the parties that all means of discovery, including but not limited to depositions and interrogatories, will be afforded to the parties involved in the arbitration, and the appointed arbitrator shall have all authority to impose sanctions against either party for failing to comply with the rules for discovery provided under the Nevada Rules of Civil Procedure.

Any arbitration carried out under the provisions of GC 6.6, ARBITRATION, shall be heard and determined by a three (3) member panel. From a list of arbitrators provided by the American Arbitration Association, Carson City shall select one (1) member of the panel and the Contractor shall select one (1) member of the panel. The third member of the panel shall be selected from said list by the first two (2) members and shall be approved by both Carson City and the Contractor. The third (3rd) member shall function as the Chairperson of the arbitration panel.

The Contractor shall carry on the Work and maintain progress during any arbitration or any other disputes unless otherwise mutually agreed upon in writing.

Arbitration conducted in accordance with this provision shall take place in Carson City, Nevada.

GENERAL CONDITIONS

SECTION 7.0 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

GC 7.1 GENERAL

The Contractor shall provide all temporary facilities and utilities required for prosecution of the Work, protection of employees and the public, protection of the Work from damage by fire, weather or vandalism, and such other facilities as may be specified or required by any legally applicable law, ordinance, rule, or regulation.

GC 7.2 TEMPORARY UTILITIES AND CONSTRUCTION FACILITIES

7.2.1 ELECTRICAL SERVICE

The Contractor shall arrange with the local utility to provide adequate temporary electrical service at a mutually agreeable location. The Contractor shall then provide adequate jobsite distribution facilities conforming to applicable codes and safety regulations. The Contractor shall provide, at its own cost, all electric power required for construction, testing, general and security lighting, and all other purposes whether supplied through temporary or permanent facilities.

7.2.2 WATER

The Contractor shall pay for and shall provide for all facilities necessary to furnish water for its use during construction. Water used for human consumption shall be kept free from contamination and shall conform to the requirements of the state and local authorities for potable water. The Contractor shall pay for all water used for the Contractor's operations prior to final acceptance. The Contractor shall be responsible for obtaining a City water meter and paying all associated charges, including monthly water usage.

The Contractor is hereby informed that Carson City does not allow use of potable water for dust control on unpaved areas and/or earthwork compaction except for health safety concerns as determined by NDEP. The Contractor must obtain a "Treated Wastewater Effluent for Construction Purposes Permit" from the Carson City Wastewater Treatment Plant located at 3320 E. Fifth Street, Carson City. Special arrangements must be made with the Carson City Water Utility located at 3505 Butti Way, Carson City, for use of potable water for dust control on paved areas.

7.2.3 TEMPORARY LIGHTING

The Contractor shall provide temporary lighting in all work areas sufficient to maintain a lighting level during working hours not less than the lighting level required by OSHA standards. As permanent lighting facilities are completed they may be used in lieu of temporary facilities, provided however, that bulbs, lamps, or tubes of such facilities used by the Contractor shall be replaced prior to final acceptance of the Work.

7.2.4 HEATING AND VENTILATION

The Contractor shall provide means for heating and ventilating all work areas as may be required to protect the Work from damage by freezing, high temperatures, weather, or to provide a safe environment for workers. Unvented direct fired heaters shall not be used in areas where freshly placed concrete will be exposed to the combustion gases until at least two hours after the concrete has attained its initial set.

7.2.5 SANITARY CONVENIENCES

The Contractor shall provide suitable and adequate sanitary conveniences for the use of all persons at the site of the Work. Such conveniences shall include chemical toilets or water closets and shall be located at an appropriate location at the site of the Work. All sanitary conveniences shall conform to the regulations of the public authority having jurisdiction over such matters. At the completion of the Work, all such sanitary conveniences shall be removed and the site left in a sanitary condition.

7.2.6 COMMUNICATIONS

The Contractor shall provide, at its own cost, telephone communications to the Project Site either through ground lines or cellular equipment.

GENERAL CONDITIONS

7.2.7 CONSTRUCTION FACILITIES

Construction hoists, elevators, scaffolds, stages, shoring, and similar temporary facilities shall be of ample size and capacity to adequately support and move the loads to which they will be subjected. Railings, enclosures, safety devices, and controls required by law or for adequate protection of life and property shall be provided.

A. Staging and Falsework

Temporary supports shall be designed by a professional registered engineer with an adequate safety factor to assure adequate load bearing capability. If requested by the Construction Manager, the Contractor shall submit design calculations for staging and shoring prior to application of loads.

Excavation support shall be in accordance with GC 2.6.12 (D), Excavation Safety.

B. Temporary Enclosures

When sandblasting, spray painting, spraying of insulation, or other activities inconvenient or dangerous to property or the health of employees or the public are in progress, the area of activity shall be enclosed adequately to contain the dust, over-spray, or other hazard. In the event there are no permanent enclosures of the area, or such enclosures are incomplete or inadequate, the Contractor shall provide suitable temporary enclosures.

C. Warning Devices and Barricades

The Contractor shall adequately identify and guard all hazardous areas and conditions by visual warning devices and, where necessary, physical barriers. Such devices shall, as a minimum, conform to the requirements of OSHA and MUTCD.

D. Use of Explosives

All persons engaged in the activities of receiving, storing, using, handling or transporting any explosives must obtain a permit from the Carson City Fire Department; and all work shall be governed by Title 14, Fire, of the Carson City Municipal Code. The Contractor must notify the Construction Manager at least 14 days prior to the use of explosives.

GC 7.3 CONSTRUCTION CONTROLS

7.3.1 PROTECTION AND RESTORATION OF EXISTING IMPROVEMENTS

The Contractor shall not trespass upon private property and shall be responsible for the protection of public and private property at and adjacent to the Work and shall exercise due caution to avoid damage to such property.

The Contractor shall not infringe upon wetland areas at the Site, whether identified or not, without the written approval of the Construction Manager. Infringement on wetlands will give cause for suspension of all work being conducted on or adjacent to the wetland area.

In addition to any requirements imposed by law, the Contractor shall shore up, brace, underpin, and protect as may be necessary, all foundations and other parts of all existing structures adjacent to and adjoining the Site of the Work which are in any way affected by the excavations or other operations connected with the performance of the Work. Whenever any notice is required to be given to any adjacent or adjoining landowner or other party before commencement of any work, such notice shall be given in writing by the Contractor.

The Contractor shall repair or replace all existing improvements which are not designated for removal (e.g., curbs, sidewalks, survey points, fences, walls, signs, utility installations, pavements, structures, irrigation lines and facilities, etc.) and are damaged or removed as a result of its operations. Repairs and replacements shall be at least equal to existing improvements and shall match them in finish and dimension.

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Land survey monuments and property marks shall not be moved or otherwise disturbed by the Contractor until the Contractor arranges for a Nevada licensed Land Surveyor to witness or otherwise reference their locations in accordance with the requirements of the agency having jurisdiction. Any survey monument or property mark so moved or disturbed must be re-established and re-set by a Nevada licensed Land Surveyor in accordance with the requirements of the agency having jurisdiction.

Trees, lawns, and shrubbery that are not to be removed shall be protected from damage or injury. If damaged or removed because of the Contractor's operations, they shall be restored or replaced in as nearly the original conditions and location as is reasonably possible or better. Where existing turf areas are damaged, they must be replaced with fresh sod of matching grass.

The Contractor shall give reasonable notice, as determined by the Construction Manager, to occupants or owners of adjacent property to permit them to salvage or relocate plants, trees, fences, sprinklers, and other improvements within the right-of-way which are designated for removal or would be destroyed because of the Work.

A. Flood Protection

During the construction period, the Contractor shall be responsible for any damage which may result from flooding, including any earthwork re-excavation or replacement that may be a result of flooding. The Contractor shall submit to the Construction Manager a flood control plan for trenching operations associated with the Work. The flood control plan shall describe the Contractor's plan for control and diversion of surface runoff and flood flows around trench and structure excavations, and the Contractor's action plan for protection of the work and Contractor's plant and equipment during flood events.

7.3.2 PROJECT SECURITY

The Contractor shall make adequate provision for the protection of the Work area against fire, theft, and vandalism, and for the protection of the public against exposure to injury. Contractor shall call the Carson City Sheriff's Department at 887-2008 or call 911 in the event of any public harassment or violence to any of the Contractor's or subcontractor's employees.

A. Fire Extinguisher

Sufficient number of fire extinguishers of the type and capacity required to protect the Work and ancillary facilities, shall be provided and maintained in readily accessible locations.

B. Temporary Fences

The Contractor shall enclose the site of the Work other than roadways with a fence or barricades adequate to protect the Work and temporary facilities against acts of theft, violence, or vandalism. Work within the roadway right-of-way shall be protected as provided for in the "Manual on Uniform Traffic Control Devices."

In the event all or a part of the site is to be permanently fenced, this permanent fence or a portion thereof may be built to serve for protection of the Work site, provided however, that any portions damaged or defaced shall be replaced prior to final acceptance.

Temporary openings in existing fences shall be protected to prevent intrusion by unauthorized persons. During night hours, weekends, holidays, and other times when no work is performed at the site, the Contractor shall provide temporary closures or guard service to protect such openings. Temporary openings shall be fenced when no longer necessary.

C. Graffiti Removal

The Contractor shall at all times keep all equipment, traffic control devices, materials, office trailers, storage facilities, the Work and the site free from graffiti. The Contractor shall remove all graffiti within 24 hours of notification by the Construction Manager. All expenses associated with graffiti removal shall be the responsibility of the Contractor.

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7.3.3 ACCESS ROADS

Access roads shall be maintained to all storage areas and other areas to which frequent access is required. Similar roads shall be maintained to all existing facilities on the site of the Work to provide access for delivery of material and for maintenance and operation. Where such temporary roads cross buried utilities that might be injured by the loads likely to be imposed, such utilities shall be adequately protected by steel plates or wood planking, or bridges shall be provided so that no loads shall discharge on such buried utilities.

7.3.4 NOISE ABATEMENT

Operations at the site shall be performed to minimize unnecessary noise. Special measures shall be taken to suppress noise during night hours. Noise levels due to construction activity shall not exceed the following levels:

Allowable Daytime Noise Levels as measured at the exterior of any given site shall be a noise level of not more than 75 dba Leq from the hours of 7:00 AM to 8:00 PM daily.

Allowable Nighttime Noise Levels as measured at the exterior of any site shall be a noise level of not more than 55 dba Leq from the hours of 8:00 PM to 7:00 AM daily.

Internal combustion engines used on the Work shall be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall be operated without said muffler.

7.3.5 WORKING HOURS

Construction shall be allowed only between the hours of seven (7:00) AM and four (4:00) PM Monday thru Friday (Normal Working Hours) unless otherwise specified in the Special Conditions.

The starting, fueling, maintenance of equipment, and delivery of equipment and materials, and placement or removal of traffic control devices is considered Construction and shall not be allowed outside of the Normal Working Hours. Requests for exceptions to these limitations shall be made in writing to the Construction Manager for consideration in non-sensitive, non-residential areas.

The Contractor may request to work outside the Normal Working Hours by submitting a written request to the Construction Manager at least seventy-two (72) hours in advance of the start of work outside the Normal Working Hours. Permission may or may not be granted by the Construction Manager, with hours noted by the Construction Manager. The Contractor shall be responsible for the costs of any inspection, testing, and additional administration incurred by the City, or its agents and representatives, for work by the Contractor outside the Normal Working Hours defined above, on weekdays in excess of eight (8) hours, or any work on weekends or holidays recognized by the City. Such costs shall be withheld from the succeeding monthly progress payment. Any work specifically required to be performed outside the Normal Working Hours as may be indicated in the Special Conditions, or work required by the Construction Manager, in writing, to be performed outside the Normal Working Hours, is excluded from withholding of payment.

7.3.6 DRAINAGE CONTROL / STORM WATER POLLUTION PREVENTION PLAN

In all construction operations, care shall be taken not to disturb existing drainage patterns whenever possible. Particular care shall be taken not to direct drainage water onto private property. Drainage water shall not be diverted to streets or drainage ways inadequate for the increased flow. Drainage means shall be provided to protect the Work and adjacent facilities from damage due to water from the site or due to altered drainage patterns from construction operations. Temporary provisions shall be made by the Contractor to insure the proper functioning of gutters, storm drain inlets, drainage ditches, culverts, irrigation ditches, and natural water courses. The Contractor shall provide water quality and erosion controls in accordance with the NDEP "Handbook of Best Management Practices" to prevent sedimentation runoff from the Site.

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The Contractor shall comply with the National Pollutant Discharge Elimination System (NPDES) regulations for storm water discharges from a construction site and the Stormwater General Permit NVR100000, State of Nevada, Division of Environmental Protection, General Permit. Preparation of a Storm Water Pollution Prevention Plan (SWPPP) and compliance with the permitting requirements shall be the Contractor's responsibility. The Contractor shall submit the required Notice of Intent (NOI) to the NDEP and comply with the SWPPP referenced above. The Contractor shall obtain any required Temporary Permits prior to any discharges. The Contractor shall submit any required Notification of Termination to the NDEP upon completion of construction and final site stabilization, and shall submit to the City copies of all records associated with the permitting requirements. Contractor must submit a copy of the SWPPP permit and plan to the Construction Manager prior to the start of work.

The Contractor shall be responsible for all costs associated with complying with the permit requirements, submitting any required NOI, preparing and complying with the SWPPP, revising the SWPPP, any required submittal of the Notification of Termination, any required discharge permit and any other related costs.

7.3.7 CONSTRUCTION CLEANING

The Contractor shall, at all times, keep property on which work is in progress and the adjacent property free from accumulations of waste material, rubbish, caused by his/her operations. All surplus material shall be removed from the site immediately after completion of the work causing the surplus materials. Spillage resulting from hauling operations along or across existing streets or roads shall be removed immediately by the Contractor. All gutters and roadside ditches shall be kept clean and free from obstructions. Daily cleanup of trash, paper, and small debris subject to movement with winds shall be required. **The Contractor shall reasonably clean the immediate Work Area on a daily basis to reduce risk of personal injury as well as fire hazard.**

7.3.8 DISPOSAL OF MATERIAL

Unless otherwise specified in the Special Conditions, the Contractor shall make his/her own arrangements for disposing of construction waste materials outside the Project Site and the Contractor shall pay any and all dump fees required, except as provided below. If the Contractor arranges to dispose of construction waste materials on private property, he/she shall first obtain written permission from the property owner on whose property the disposal is to be made in which the City is absolved from any and all liability and responsibility in connection with the disposal of such material on said property. A copy of said written permission must be delivered to the Construction Manager prior to starting disposal operations. When construction waste material is disposed of as above provided, the Contractor shall conform to all required codes and permits pertaining to grading, hauling, and filling of earth or other materials. The Contractor shall contact the City's Community Development Department and the Health Department concerning such codes and permits.

Disposal of all construction waste including but not limited to all pipe, concrete, manholes, pavement, building and excavated materials, and all other appurtenances shall be disposed of in a manner consistent with all local, State and Federal laws and guidelines. Any hazardous waste shall be disposed of at hazardous waste disposal sites that are permitted to accept such wastes. All disposal site locations shall be approved in writing by the Construction Manager. A copy of the disposal plans and any required permits must be delivered to the Construction Manager prior to starting disposal operations.

Asbestos Cement Pipe (ACP) removed from the Project shall be separated from other material, manifested and delivered to the Carson City Landfill. For manifest and disposal requirements prior to removal of any ACP the Contractor shall contact:

Mr. David Bruketta
Operations Manager- Environmental
Cellular phone at (775) 230-2782

ACP Manifests are valid for ten (10) days from date of issuance.

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Construction waste including but not limited to all pipe, concrete, manholes, pavement, building and excavated material, and all other appurtenances removed from the Project may be accepted free of charge at the Carson City Landfill if approved under the direction of the Construction Manager. A Landfill Disposal Form will be provided by the Carson City Inspector upon request by the Contractor. The Contractor or Contractor's agent will provide a Landfill Disposal Form, which must be signed, dated and timed by a Carson City Inspector, to the Landfill Attendant for a waiver of disposal fees for each separate load. The Contractor will pay the full disposal fee if no Landfill Disposal Form from Carson City is presented to the Landfill Attendant. Carson City will not reimburse the Contractor for disposal fees due to failure to comply with these conditions.

7.3.9 PARKING AND STORAGE AREAS

All stockpiled materials and parked equipment at the job site shall be located to avoid interference with private property and to prevent hazards to the public. Locations of stockpiles, parking areas, and equipment storage must be approved by the Construction Manager. Material and equipment may not be stored in public right-of-way unless prior approval by the Construction Manager.

GC 7.4 PUBLIC SAFETY/CONVENIENCE AND TRAFFIC CONTROL

The Contractor shall so conduct his/her operations as to offer the least possible obstruction and inconvenience to the general public, including the residents, businesses and any other contractors working in the vicinity of the Work, and he/she shall have under construction no greater length or amount of work than he/she can prosecute properly with due regard to the rights of the public. Convenient access to driveways, houses, and buildings along the line of work shall be maintained and temporary crossings shall be provided and maintained in good condition. Traffic shall not be prevented from accessing business. Maintain a minimum of one (1) access to each business property at all times. Business Access signs shall be used to direct business traffic. Not more than one (1) crossing or intersecting street or road shall be closed at any one time. Safe access must be maintained for pedestrian traffic through or around the work area at all times.

Inconvenience caused by digging across driveways and sidewalks shall be kept to a minimum by restoring the serviceability of the driveway or sidewalk as soon as possible. Contractor shall provide and identify to the Construction Manager a person to act as a community liaison person, who must be fluent in English with good communication skills, to personally contact each resident and business at least three (3) working days prior to performing any Work which effects their sewer or water service, restricts on street parking, restricts access to their property, or blocks a driveway or sidewalk. Said community liaison person shall provide written notices, pre-approved by the Construction Manager, to all such residents and businesses and must be available and able to answer their questions. Copies of notices to all properties other than single family residences provided to the Construction Manager shall include a name and signature of the person accepting the notice for those properties. The Contractor shall make every effort to provide alternate access to the property during such closure, if at all possible. The Contractor shall replace or repair any damage done to driveways or sidewalks and shall provide temporary relief in the form of steel plates and supports of adequate strength over the excavation. Access to properties must be restored during all non-working hours.

Direct access shall be provided at all times to fire stations, fire hydrants, hospitals, police stations and at all other agencies or services where emergencies may require immediate access to same.

Temporary paving replacement in front of business establishments shall be placed immediately following backfill and shall remain in place until the condition of the backfill is suitable for permanent pavement replacement.

No streets or roads shall be blocked or made inaccessible, due to the Contractor's work, without approval of the City. No open excavations shall be allowed during non-working hours. Excavations shall be backfilled to grade and, if in a pavement area, temporarily paved level with adjacent pavement or, with the prior approval of the Construction Manager, covered with steel plates during non-working hours. If temporary paving and/or maintenance of temporary paving of all disturbed streets, driveways and sidewalks is not completed prior to the end of each work day, the Construction Manager may suspend the Work on the entire project, without any additional costs to the City, until the temporary paving is completed and/or properly maintained. The Construction Manager shall be the judge of proper maintenance of the temporary paving.

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If needed, the City will provide the Contractor with "Temporary No Parking" signs to be posted in the construction area by the Contractor to accommodate each day's work. The Contractor must post the "Temporary No Parking" signs in the construction area no less than seventy-two (72) hours prior to the effective start of such parking restrictions. Temporary No Parking hours are to conform to the Contractor's Working hours, but in no instance shall they exceed the Working Hours as specified in GC 7.3.5 or as amended in the Special Conditions. Contractor must keep a log of day, date, time and location that the signs are posted. If, when work starts, vehicles are parked in violation of the posted restrictions, the Contractor shall call the Carson City Sheriff's Office Dispatch Center at 887-2008 to request that the violating vehicle(s) be towed. Contractor shall identify expected no parking areas on the Traffic Control Plan and shall notify the Construction Manager at least one (1) week prior to the need for the "Temporary No Parking" signs.

7.4.1 HAUL ROUTES

Prior to hauling, the Contractor shall submit for approval the proposed route(s) for all construction traffic on the Project. This shall include any designated routes, if any, shown on the Contract Drawings. Upon approval, the Contractor shall adhere to approved routes only.

7.4.2 TRAFFIC CONTROL

During construction within traffic roadways the Contractor shall maintain no less than one (1) lane of traffic during working hours and two (2) lanes at all other times. When one-way traffic is in effect, the Contractor shall employ no less than two (2) flaggers to facilitate the safe flow of traffic. No streets or roads shall be blocked, closed or made inaccessible due to the Contractor's work, without the prior approval of the Construction Manager.

The Contractor shall provide and maintain traffic control devices such as signs, warning lights, reflectors, barriers, fences, flaggers, steel plates, barricades, light signs and other necessary safety devices and measures on all sides of the construction zone, the number, size, message and spacing of which shall be governed by the Traffic Control Plans, local ordinance, or permit requirements. Traffic control shall be in accordance with the MUTCD. Any Traffic Control for work within NDOT right-of-way shall be in accordance with the NDOT permit requirements. The Contractor shall submit for approval by the City and any other applicable agency, its traffic control plans at least two (2) weeks prior to beginning work on public streets in accordance with GC 4.0, SHOP DRAWINGS AND QUALITY CONTROL.

The Contractor shall designate a Traffic Control Supervisor who shall be responsible for preparing and signing all Traffic Control Plans, and for installing and maintaining all traffic control devices as shown on the approved Traffic Control Plans. Said Traffic Control Plans must be per the provisions of the MUTCD and any Special Conditions. The Traffic Control Supervisor shall be available to be contacted by the Construction Manager twenty-four (24) hours per day for the duration of the Contract. The Traffic Control supervisor must be certified as a worksite traffic supervisor by ATSSA. As a minimum, the Traffic Control Supervisor shall check all traffic control devices at the start, mid-day, and end of each work day and at least once on every non-working day.

In addition to the flaggers required above, the Contractor shall employ flaggers at places designated by the Construction Manager for the safe movement of the public through the Work area. Flaggers shall possess a valid flagger card attesting that they have satisfactorily completed an instructional course in flagger procedures conducted by NDOT or some other approved course given by another entity of government within the State of Nevada.

No material or equipment shall be stored or parked where it will interfere with the free and safe passage of public traffic, and at the end of each day's work, and at other times when construction operations are suspended for any reason, the Contractor shall remove all materials, equipment and other obstructions from the public right-of-way. With the prior approval of the Construction Manager, the Contractor may shield the public traffic from materials or equipment within the public right-of-way by the use of temporary concrete or water filled barrier rails.

The Contractor shall notify the Carson City Fire Department and Sheriff Department dispatch center at (775) 887-2008 at least twenty-four (24) hours in advance of rerouting public traffic when traffic patterns

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are to be altered due to construction operations. Said notification shall set forth the specific traffic patterns to be provided in lieu of the normal routing and the estimated duration of such change(s).

Should the Contractor appear to be negligent in furnishing or maintaining warning and protective measures, as above provided, the Construction Manager may direct attention to the existence of the hazard, and the necessary warning and protective measures shall be immediately furnished and installed by the Contractor at its expense. Failure to do so will be cause to suspend the Work until the deficiency is corrected. If the Contractor does not correct a Traffic Control deficiency by the end of the work day and the Construction Manager determines that the public safety is endangered, then the Construction Manager may take the necessary action to correct the deficiency pursuant to GC 2.5.4, City's Right to Carry Out the Work.

7.4.3 TRAFFIC DETOURS

Detouring traffic to private streets shall not be allowed. Advance warning/detour signs shall be used to direct through-traffic, and shall be placed to notify traffic to avoid all possible situations that require individual motorists to turn around to avoid the closure. The advanced warning signs shall be placed in accordance with the approved Traffic Control Plan. No detour or street closure signing shall be placed on any street prior to the start of Work hours and shall be removed prior to the end of Work hours unless otherwise provided in the approved Traffic Control Plan.

7.4.4 PEDESTRIAN AND BICYCLE DETOURS

Advanced warning/detour signs shall be placed to notify pedestrian and bicycle traffic of any closure and to avoid all possible situations that may require individuals to turn around to avoid the closure.

GC 7.5 PROJECT SIGNS

If required by Contract Special Conditions, the Contractor shall provide, install and maintain for the duration of the Project, Project sign(s). Two (2) signs shall be required for pipeline projects. The sign(s) shall be installed within fifteen (15) days of the Notice to Proceed and shall be installed where directed by the Construction Manager. The Project Sign(s) shall conform to the requirements listed in the Special Conditions.

GC 7.6 PROJECT OFFICE

Unless the Contractor has an office in the Carson City/Reno/Sparks area, the Contractor shall maintain a suitable office on the Project site. The Contractor shall maintain at the Project site copies of the Contract Documents, record drawings, Project schedule, submittals, permits, Material Safety Data Sheets, approved Traffic Control Plans, and other relevant documents which shall be accessible to the Construction Manager and other City representatives during normal working hours. Said site office shall be the headquarters of the Contractor's representative authorized to receive Drawings, instructions, or other communications or articles from the City or its agents unless the Contractor notifies the City otherwise per GC 2.6.1, Office.

GC 7.7 STORAGE OF MATERIALS

Materials shall be stored in such a manner as to ensure the preservation of their quality and fitness for the Work. When required by the Construction Manager, materials shall be placed on platforms or other hard, clean surfaces and covered.

Materials shall be stored so as to facilitate inspection. Storage areas shall be suitably fenced if necessary to protect the public or the material.

Locations and arrangements for storage sites for materials and equipment outside the limits of work, shall be selected and maintained by the Contractor at the Contractor's expense. Prior to occupying a storage site on private property, the Contractor shall submit a letter or agreement signed by the private property owner that authorizes the Contractor to occupy the private property. The City shall be specifically exempted in any agreement from any liability incurred from the use of private property for construction purposes. Use of portions of the City's area at the site for materials and equipment storage shall be permitted upon the approval of the Construction Manager.

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GC 7.8 HAZARDOUS MATERIALS

The storage and handling of potential pollution-causing and hazardous materials, including but not necessarily limited to: gasoline, oil, and paint shall be in accordance with all local, state, and federal requirements. All hazardous materials shall be stored and handled in accordance with the Material Safety Data Sheets for the products. Material Safety Data Sheets shall be submitted to the Construction Manager prior to the delivery of materials to the Project site. Copies of the Material Safety Data Sheets shall be maintained at the Project Site in a readily accessible location.

GC 7.9 SYSTEM TESTING

The Contractor shall test the facilities as specified in the Technical Specifications. The Contractor shall provide all other necessary facilities for conducting the tests including but not limited to: personnel, power, water, equipment, and chemicals. The Contractor shall provide a minimum of forty-eight (48) hours notice to the Construction Manager of its readiness and intent prior to each test.

GC 7.10 COORDINATION/COOPERATION WITH UTILITIES

Within the construction limits of this Project may be various utility systems including water, reclaimed water, sanitary sewers, storm drains, gas, telephone, cable television, and electric power. The approximate location of known main line utilities, as taken from existing records, is shown on the Drawings. The service connections to these facilities may not be shown on the Drawings, however, the Contractor shall field locate and protect all service connections from damage during the course of the Work. The full costs for locating and protecting such service connections shall be included in the various items of work and no additional compensation shall be allowed. Where underground main utility distribution lines are shown on the plans or marked in the field, the Contractor shall assume that every property parcel is served by service connections for each type of utility. The City and Engineer do not guarantee that all existing utilities and facilities are shown on the Drawings or that they are shown in their actual position. The Contractor shall consider it normal and expected that the elevation and alignment of said utilities may vary from that shown on the Drawings, and also that utilities may be encountered that are not shown on the Drawings. Also consider it normal and expected that utilities will prove to be an impediment to the operations and that use of other than the usual equipment and construction methods in accomplishing the necessary work over, around or under such utility installations may be necessary. Should a discrepancy be found on the Drawings, it shall not be construed to relieve the Contractor from his/her responsibility to protect any such utility or facility.

The City has notified all utility companies, all pipeline owners, or other parties known to be affected by the Project and has endeavored to have all necessary adjustments of their facilities and other appurtenances made as soon as possible to eliminate conflicts within or adjacent to the limits of construction. The Contractor shall be responsible to protect and/or support all utilities which do not have to be relocated, but which do affect the Work. Where the City has made arrangements with utility owners to relocate or adjust their facilities, the City's responsibility for such adjustments are shown on and called out at the specific locations on the plans.

Any delays to the Contractor's operations performing the current critical item(s) of work on the latest favorably reviewed Construction Schedules as a direct result of utility or other facilities not being rearranged as herein provided (other than delays in connection with rearrangements made to facilitate Contractor's construction operations) will be considered excusable delays within the meaning of GC 3.12.2, Excusable Delays.

It shall be the Contractor's full responsibility to call Underground Service Alert (USA) at (1-800-227-2600) not less than two (2) working days, but not more than fourteen (14) calendar days, prior to performing any excavation, for location mark-out of any underground utilities and obtaining an inquiry identification number. Contractor must comply with all instructions received from USA.

Note: Per NRS 455.082, the approximate location of a subsurface installation marked in response to a notice to USA means a strip of land not more than twenty-four (24) inches on either side of the exterior surface of a subsurface installation.

If a private underground utility such as gas, electric, telephone or cable television facility must be located or adjusted for construction operations and its location differs by more than twenty-four (24) inches on either side of the exterior surface of the subsurface facility from that shown on the plans or marked in the field, the City shall

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reimburse the Contractor, as extra work, for the difference between the costs incurred in finding the actual location of the facility and the costs of finding the reputed location of the facility.

Contractor shall pothole all indicated, shown, or marked utilities and points of connection to verify their exact location. The Contractor shall have the proposed Work laid out in the filed by a Nevada Licensed Professional Land Surveyor or the Surveyor's subordinates prior to commencing with the potholing. The Contractor shall then pothole prior to performing any other Work including saw cutting for the work. The Contractor shall obtain data (on a form provided by the Construction Manager) to include type, size, and dimensions, material, location and elevation of the underground utilities, referenced to the Surveyor's lay out stakes for each pothole. The Contractor shall provide to the Construction Manager, all data, and shall identify to the Construction Manager any facilities which conflict with the Work on the day the pothole is performed. Carson City will not be responsible for any damages, delays or standby time caused by the Contractor's failure to perform potholing prior to commencement of the Work, failure to provide the data or identify the conflicts when specified, or failure to locate services, laterals or points of connections.

Carson City will be responsible for repairs, damages and standby time caused the Contractor due to non-marking, mis-marking or mis-locating, as defined in NRS 455.082, of the City's main line water mains, reclaimed water mains, sanitary sewer main lines and storm drains. Compensation to the Contractor for such repairs, damages or standby time shall be calculated on the basis of GC 6.4.3, Force Account Payment. NOTE: This provision does not apply to service laterals/connections unless the Contractor can show he/she used diligence in trying to locate each service.

The Contractor shall not interrupt the service function or disturb the support of any utility without authority from the utility owner. All valves, switches, manholes, vaults, and meters shall be maintained readily accessible for emergency shutoff or access. In case it should be necessary to move or temporarily maintain the property of any utility, the cost of which is not required to be borne by the owner thereof, the Contractor shall bear all time required and all expenses incidental to the removal or temporary maintenance of such property in a manner satisfactory to the owner thereof. The work necessary to the raising, lowering, or relocating of a utility may be done by the owner of the utility or by the Contractor, at the option of the utility owner. All work shall be in accordance with the utility owner's standards, and shall be at the Contractor's time and expense unless otherwise expressly provided for in the Special Conditions.

The Contractor shall repair or replace all utilities damaged or destroyed due to his/her operations, even in the event such damage or destruction occurs after backfilling or is not discovered until after completion of backfilling. The Contractor shall resolve all crossing and clearance problems with the utility company concerned and the Construction Manager. The right is reserved to the State, County, City, and owners of private utilities and franchises to enter at any time upon any street, alley, right-of-way, or easement for the purpose of making changes in their property made necessary by the Work and for the purpose of maintaining and making repairs to their property.

In cases where water or sewer mains, or service connections thereto, are accidentally broken or, with the prior approval of the Construction Manager, are intentionally cut by the Contractor, they shall be fully repaired to City specifications and returned to service within four (4) hours, or sooner if deemed necessary by the Construction Manager. The Contractor is to make these repairs a priority over other portions of the Work.

At all times allow the Fire Department access to fire hydrants. Do not place materials or other obstructions closer to a fire hydrant than permitted by ordinance, rules, or regulations or within fifteen (15) feet of the fire hydrant in the absence of such ordinances, rules, or regulations.

GC 7.11 CONTAMINATED GROUNDWATER and/or SOIL

Contaminated groundwater and/or soil may exist anywhere within the Project limits. If contaminated groundwater and/or soil are encountered during construction, the Contractor must act in accordance with all applicable Federal, State, and local laws and Nevada Administrative Code 445A.347, which requires the Nevada Department of Environmental Protection be notified within twenty-four (24) hours of the encounter at (775) 687-4670.

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GC 7.12 DUST CONTROL

The Contractor is responsible for the control of dust originating from any and all of the Contractor's construction operations either within or outside of the Work Area at all times in accordance with Federal, State and local laws, at the Contractor's expense. In areas where fugitive dust is a nuisance, the Contractor shall, as often as necessary, wet down the area to prevent dusty conditions. This includes weekends and holidays. The Contractor shall contact NDEP to determine if a Ground Disturbance Permit is required.

GC 7.13 BY-PASS PUMPING OF SANITARY SEWER

The Contractor shall prepare and submit to the Construction Manager a plan for by-pass pumping of sanitary sewers which will provide for adequate size pumps and hoses to carry the flows from one manhole to another. Hoses must be rated for traffic if traffic is allowed on the roadway where the hose is placed. Provide a backup pump, replacement hose sections and a backup power source at the work site prior to commencing any by-pass pumping operations. Contractor must test the by-pass pumping system, including the backup pump, in the presence of the Construction Manager or his/her representative prior to effecting the flow in the existing sanitary sewer to be diverted. Contractor must identify and have available during pumping operations a person capable and qualified to make emergency repairs in case of a failure of any part of the by-pass pumping operation. The Contractor shall ensure that no spillage of raw sewage will occur on or in the ground. The by-pass pumping plan shall also address how an accidental spill of raw sewage would be contained and mitigated.

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SECTION 8.0 CONTRACT COMPLETION, O&M MANUALS

GC 8.1 INTERMEDIATE COMPLETION

When an intermediate milestone is specified in the Contract Documents, and the Contractor considers that a Work element, section, or division has met the intermediate completion stage requirements, the Contractor shall notify the Construction Manager in writing. Upon receipt of the notification, the Construction Manager and the City will make inspection to determine if the Work element, section or division is sufficiently complete in accordance with the Contract Documents to determine its acceptability for Intermediate Completion and for determination of any other items which do not meet the terms of the Contract so the City can occupy or utilize the Work for its intended use. Upon verification that the Work element, section, or division meets the contractual requirements for Intermediate Completion, the Construction Manager shall prepare a Notice of Intermediate Completion letter for the City's signature. The notice shall establish the date of Intermediate Completion, the responsibilities of the City and Contractor for maintenance, utilities, and damage to the subject Work. If items are found which prevent such use or occupancy, the Construction Manager shall notify the Contractor of such items.

Upon the completion of such corrective work, the Contractor shall so notify the Construction Manager in writing. The Contractor agrees to pay the City's actual costs including, but not limited to, charges for engineering, inspection and administration incurred due to the Contractor's failure to complete the punch list work within the time period specified.

Unless otherwise specified under Special Conditions, no partial acceptance of any portion of the Work will be made and no acceptance other than the final acceptance of the overall completed Project will be made. No review pertaining to specific parts of the Project shall be construed as final acceptance of any part until the overall final acceptance by the City is made. Final payment for completed portions of Work will not be made until final acceptance of the total Work.

GC 8.2 SUBSTANTIAL COMPLETION

When the Contractor considers that all Work required by this Contract including equipment start-up and testing is substantially complete, the Contractor shall notify the Construction Manager in writing. Upon receipt of the notification, the Construction Manager and the City will make inspection to determine if the Work is sufficiently complete in accordance with the Contract Documents to determine its acceptability for Substantial Completion and for determination of any other items which do not meet the terms of the Contract so the City can occupy or utilize the Work for its intended use. If items are found which prevent such use or occupancy, the Construction Manager shall notify the Contractor of such items. Upon verification that the Project is substantially complete, the Construction Manager shall prepare a Notice of Substantial Completion letter for the City's signature. The notice shall establish the date of Substantial Completion and the responsibilities of the City and Contractor for maintenance, utilities, and damage to the Work.

GC 8.3 CONSTRUCTION COMPLETION, FINAL INSPECTION, PAYMENT, AND ACCEPTANCE

When the Contractor considers that all Work including record drawings, operation and maintenance manuals, and cleanup has been completed in accordance with the terms of the Contract, the Contractor shall notify the Construction Manager. Upon notification, the Construction Manager and the City will make the pre-final inspection to determine the actual status of the Work in accordance with the terms of the Contract. If materials, equipment, or workmanship are found which do not meet the terms of the Contract, the Construction Manager shall prepare a final punch list of such items and submit it to the Contractor. Following completion by the Contractor of the corrective work, required by the punch list, the Construction Manager shall notify the City that the Work has been completed in accordance with the Contract. A final inspection will be made to determine the acceptability of the Work. After completion of the Work, but prior to its acceptance by the City, the last partial payment will be made to the Contractor.

After receipt of the last partial payment, but prior to acceptance of the Work by the Carson City Board of Supervisors or Carson City Regional Transportation Commission, the Contractor shall send a letter to the Construction Manager submitting lien releases for all material, or labor for any work covered by this Contract. The letter shall state that acceptance of the final payment described below shall operate as and shall be, a release to the City, the Construction Manager, the Design Consultant, and their duly authorized agents, from all claims

GENERAL CONDITIONS

and/or liability to the Contract arising by virtue of the Contract related to those amounts. Disputed Contract claims in stated amounts previously filed as provided in GC 6.3.2, Claims, may be specifically excluded by the Contractor from the operation of the release.

Following receipt of all required submittals, the Construction Manager's written statement that construction is complete, and recommendation from the City's representative to accept the Project, the Construction Manager shall prepare an agenda item for the Carson City Board of Supervisor's or Carson City Regional Transportation Commission's acceptance of the completed Work and a Notice of Completion.

Following the acceptance by the Carson City Board of Supervisors or the Carson City Regional Transportation Commission of the completed Work embraced in the Contract, the City will cause to be recorded in the office of the County Recorder a Notice of Completion.

Thirty (30) days after recording the Notice of Completion of the Work involved in the Contract, the City will pay the Contractor such sums of money as may be due the Contractor including all sums retained but excluding such sums as have previously been paid the Contractor. This payment will constitute the final payment to the Contractor under this Contract.

GC 8.4 OPERATION AND MAINTENANCE MANUALS

Prior to the delivery and installation of any item of machinery or equipment, the Contractor shall submit one (1) copy of the Operation and Maintenance Manual(s) as required by the Technical Specifications. The manual(s) will be reviewed by the Construction Manager and/or Design Consultant for content and the Construction Manager will advise the Contractor within five (5) working days of receipt if the manual is acceptable for the delivery and installation of the equipment or machinery. No equipment or machinery shall be tested or installed if the general content of the manual is found to be deficient. The final Operation and Maintenance Manuals, three (3) copies, must be submitted and favorably reviewed prior to final acceptance.

GC 8.5 EQUIPMENT START-UP

After all acceptance tests have been completed by the Contractor, but prior to final acceptance, the Contractor shall recheck all equipment for proper alignment and adjustment, check oil levels, relubricate all bearing and wearing points, and assure that all equipment is in proper condition for regular continuous operation. Final start-up of equipment requires forty-eight (48) hours advance notice to the Construction Manager and coordination with the user department of the City. Start-ups shall only occur Monday through Thursday.

GC 8.6 FINAL CLEAN UP

At the completion of the Work and before final inspection, the Contractor shall clean the Work Area, material sites, adjacent property and streets and all grounds occupied by the Contractor in connection with the Work of all rubbish, excess and waste materials, as well as all his/her tools, construction equipment, machinery and temporary facilities. All parts of the Work shall be left in a neat and clean condition. If the Contractor fails to clean up at the completion of the Work, the City may do so and the cost shall be charged to the Contractor.

GC 8.7 WARRANTY OF TITLE

No material, supplies, or equipment for the Work under this Contract shall be purchased subject to any chattel mortgage, security agreement, or under a conditional sale or other agreement by which an interest therein or any part thereof is retained by the seller or supplier. The Contractor warrants clear title to all material, supplies, and equipment installed or incorporated in the Work and agrees upon completion of all work to deliver the premises, together with all improvements and appurtenances constructed or placed thereon by the Contractor, to the City free from any claim, liens, security interest, or charges, and further agrees that neither the Contractor nor any person, firm, or corporation furnishing any materials or labor for any work covered by this Contract shall have any claims, liens, security interests or charges against this Project, provided that this shall not preclude the Contractor from installing metering devices or other equipment of utility companies, the title of which is commonly retained by the utility company. Nothing contained in this Section, however, shall defeat or impair the right of such persons furnishing materials or labor under any bond given by the Contractor for their protection or any right under any law permitting such persons to look to funds due the Contractor in the hands of the City. The provisions of this Section shall be inserted in all subcontracts and material contracts, and notices of its provisions shall be given to all persons furnishing materials for the work when no formal contract is entered into for such materials.

GENERAL CONDITIONS

GC 8.8 RECORD DRAWINGS

The Contractor shall keep at the Site a copy of the Contract drawings and specifications, including addenda and change orders, to which the Design Consultant, Construction Manager, and City shall have access at all times.

The Contractor shall maintain one (1) set of specifications and full size drawing prints and mark thereon in red any and all deviations from plan dimensions, elevations, or orientations, and all changes from addenda, change orders, and clarifications. Marked prints shall be updated at least weekly and shall be available to the City for review. Prior to Final

Acceptance by the City, the Contractor shall submit the record Drawings to the Construction Manager in the manner and format specified in the Special Conditions.

GC 8.9 WARRANTY

The Contractor hereby agrees to make, at its own expense, all repairs or removals and replacements necessitated by defects in materials or workmanship supplied under the terms of this Contract, and to pay for any damage to other works resulting from repairs or removals and replacements of such defects which become evident within one (1) year after the date of Substantial Completion of the Project by Carson City or within such longer period of time as may be prescribed by law or by the terms of any applicable technical specification. The Contractor further assumes responsibility for a similar guarantee for all work and materials provided by subcontractors or manufacturers of packaged equipment components. The Contractor also agrees to indemnify, defend, and hold the City, and its officers, agents, employees, and volunteers harmless from liability of any kind arising from damage due to said defects.

The Contractor shall execute and submit a completed Warranty Form in the format as appended to this section for the Work. The Warranty Form shall be submitted prior to the final acceptance of the Project or within five (5) days of the occupancy or use of a portion of the Work, whichever is applicable.

The Contractor shall, upon the receipt of written notice from the City, promptly make all repairs or removals and replacements arising out of defective materials, workmanship, or equipment. The City is hereby authorized to make such repairs or removals and replacements, and the Contractor and its Surety shall be liable for the cost thereof, if five (5) days after receipt of such written notice to the Contractor, the Contractor has failed to make or undertake the repairs or removals and replacements with due diligence. In case of emergency, where in the opinion of the City delay could cause serious loss or damage, repairs or removals and replacements may be made without notice being sent to the Contractor, and the expense in connection therewith shall be charged to the Contractor, and its Surety shall be liable for the cost thereof. Such action by the City shall not relieve the Contractor of the guarantees required by this Section or elsewhere in the Contract Documents.

This Section does not in any way limit the warranty on any items for which a longer warranty is specified or on any items for which a manufacturer or supplier gives a warranty for a longer period. The Contractor agrees to act as a co-guarantor with such manufacturer or supplier and shall furnish the City all appropriate guarantee or warranty certificates upon completion of the Work. No warranty period, whether provided for in this Section or elsewhere, shall in any way limit the liability of the Contractor or his/her sureties or insurers under the indemnity or insurance provisions of these General Conditions.

Prior to the expiration of the Warranty period, the City reserves the right to hold a meeting with the Contractor. The purpose of the meeting would be to review warranties, bonds, and maintenance requirements and determine required repair or replacement requirements of defective items.

For the purpose of this paragraph, acceptance of the Work or a portion of the Work by the City, shall not extinguish any covenant or agreement on the part of the Contractor to be performed or fulfilled under this Contract which has not, in fact, been performed or fulfilled at the time of such acceptance. All covenants and agreements shall continue to be binding on the Contractor until they have been fulfilled.

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WARRANTY FORM

Warranty For

_____ (Project/Component)

_____ (Location)

We hereby guarantee the _____ (Project/Component) _____ that we have constructed for a period of one (1) year from _____ (Date) _____ the date of Substantial Completion of the Work set by Carson City.

The following items are excluded from the provisions of this warranty:

We agree that if any of the material or equipment should fail due to any reason other than improper maintenance or improper operation, if any pipe or appurtenances should develop leakage, or if any settlement of fill or backfill occurs, or should any portion of the Work fail to fulfill any of the requirements of the Contract Documents, we will, within five (5) days of receipt of written notice of such defects, commence to repair or replace the same together with any other work which may be damaged or displaced in so doing.

In the event of our failure to comply with the above mentioned conditions within a reasonable time after being notified, or should the urgency of the case require repairs or replacements to be made before we can be notified or respond to notification, we do hereby authorize Carson City, to proceed to have the defect repaired and made good at our expense, and we will pay the cost therefor upon demand.

The warranty provided herein shall not be in lieu of, but shall be in addition to any warranties or other obligations otherwise imposed by the Contract Documents and by law.

Contractor:

Signed:

Title:

Date:

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SECTION 9.0 PREVAILING WAGE

GC 9.1 PREVAILING WAGE RATES

- A. The Contractor and subcontractors shall be bound by and comply with all federal, state and local laws with regard to minimum wages, overtime work, hiring and discrimination, including Chapter 338 of the NRS, which is entitled, "Public Works Projects." The Contractor shall ensure that all employees on the work site are paid in accordance with the CURRENT PREVAILING WAGE RATES AS APPROVED BY THE STATE LABOR COMMISSIONER, whenever the actual value of the Contract totals One Hundred Thousand Dollars (\$100,000) or more, or when required by the Special Conditions. A copy of the rates are attached hereto and included herein. If a Change Order causes a Contract to exceed One Hundred Thousand Dollars (\$100,000), the State Labor Commissioner may audit the entire Contract period.

When federal money is associated with the project making the Contract subject to both state and federal wage rates, the Contractor shall not pay less than the higher rate when the two rates differ for similar kinds of labor.

Questions involving the Prevailing Wage Rates for Carson City should be referred to the Labor Commissioner, State of Nevada, at (775)687-4850.

- B. Posting of Minimum Wage Rates - In accordance with NRS, Chapter 338, Section 338.020, the Contractor shall post the hourly and daily rate of wages to be paid to each of the classes of mechanics and workers on the site of Work of this Contract in a place generally visible to the workers.
- C. Pursuant to NRS 338.060 and 338.070, the Contractor hereby agrees to forfeit, as a penalty to the City, not less than Twenty Dollars (\$20) nor more than Fifty Dollars (\$50) for each calendar day or portion thereof that each worker employed on the Contract is paid less than the designated rate for any work done under the Contract, by the Contractor or any subcontractor under him/her, or is not reported to the City as required by NRS 338.070.
- D. The Contractor and each subcontractor shall keep or cause to be kept an accurate record showing the name, the occupation and the actual per diem, wages and benefits paid to each worker employed by him/her in connection with the public Work. The General Contractor shall collect the wage reports from the Sub-Contractors and ensure the receipt of a certified copy of each weekly payroll for submission to the City as one complete package.
- E. The record must be open at all reasonable hours to the inspection of the City, and its officers and agents. A copy of the record for each calendar week for the General Contractor and all Sub-Contractors must be sent to the City by the General Contractor no later than one (1) week after the end of the week. The copy must be open to public inspection as provided in NRS 239.010.
- F. The Contractor and all subcontractors hereby agree not to hinder on-site interviews of the Contractor's or subcontractor's workers by the Construction Manager or his/her representative to verify that the workers are being paid the prevailing wage rates.
- G. It is unlawful for any Contractor in connection with the performance of work under a contract with the state, or any of its political subdivisions, when payment of the Contract Price, or any part of such payment, is to be made from public funds, to refuse to employ or to discharge from employment any person because of his/her race, color, creed, national origin, sex, sexual preference or age, or to discriminate against a person with respect to hire, tenure, advancement, compensation or other terms, conditions or privileges of employment because of his/her race, creed, color, national origin, sex, sexual preference or age. The Contractor agrees to insert this

GENERAL CONDITIONS

provision in all subcontracts hereunder except subcontracts for standard commercial supplies or raw materials.

GC 9.2 NO EXTRA COMPENSATION

All work necessary to be performed after regular working hours, on Sundays or Legal Holidays, shall be performed without additional expense to the City. In case of extra work under the provisions of GC 6.4, MODIFICATION PROCEDURES, no additional payment will be made to the Contractor because of the payment by him/her of overtime wage rates for such work unless the use of overtime work in connection with such extra work is specifically ordered in writing by the City.

END OF GENERAL CONDITIONS

SPECIAL CONDITIONS

These Special Conditions amend or supplement the Standard Terms and Conditions and General Conditions of the Contract and add other Special Conditions to the contract document as indicated below, and amend or supplement the Technical Specifications. All provisions of the Contract which are not so amended or supplemented remain in full force and effect.

SC.1 SCOPE OF WORK

The Fleet Facility Expansion Project consists of adding office space and two maintenance bays to the existing Fleet Facility located at 3303 Butti Way. The project also consists of additive alternates to include new trench drains in the existing facility, a new wash bay with concrete aprons, upper level finishes to two offices including interior finishes, concrete aprons on the north and south side of the new facility expansion, demolition of the existing interior two-story office/restroom wood structure in the existing fleet maintenance facility, and mechanical and electrical work in the existing building.

SC.2 AMENDMENTS TO CONTRACT AWARD

CA. 9 Notice to Proceed

Replace entire paragraph with the following:

Within ten (10) calendar days of receipt of all required post-bid documents and information, including bonds, insurances, executed Contract, schedule of values and approved project construction schedule, the City will issue the Notice to Proceed.

CA. 10 Time: Completion of Project

A. Time

Change "calendar days" to "working days"

B. Liquidated Damages

Change "calendar days" to "working days"

SC.3 AMENDMENTS TO GENERAL CONDITIONS

The following provisions amend or supplement the General Conditions of the Contract. All provisions of the Contract which are not so amended or supplemented shall remain in full force and effect.

SECTION 1.0 INTENT, DEFINITIONS, ABBREVIATIONS

GC 1.3 Governing Order of Bidding and Contract Documents

Add the following to the end of the ninth order of precedence (standard specifications):

Revision No. 6 dated 2-29-2012.

GC 1.5 Definitions

*Revise "Contract Time" as follows:
Replace "calendar days" with "working days".*

Revise "Standard Specifications" to add the following revision date:

Revision No. 6 dates 2-29-2012.

SPECIAL CONDITIONS

Revise "Working Day" to add the following revision date:

Replace the entire paragraph with the following:

Working Day- A calendar day on which weather and other conditions not under the control of the Contractor will permit construction operations to proceed for at least 5 hours of the day with at least seventy-five (75) percent of the normal working force engaged in performing the current critical item(s) of work on the latest favorably reviewed Construction Schedule, exclusive, however, of Friday, Saturdays, Sundays, City recognized holidays, and any day that is incumbent upon the Contractor, by means of a Master Labor Agreement, to observe as a holiday. However, if the Contractor elects to work on such days, those days will be considered as working days.

SECTION 2.0 CONTRACT ADMINISTRATION AND RESPONSIBILITIES: OWNER'S REPRESENTATIVE, CONSTRUCTION MANAGER, DESIGN CONSULTANT AND CONTRACTOR:

GC 2.6.9 Permits

The Contractor shall obtain from the City a no cost building permit for the construction of all improvements.

GC 2.6.9 Contractor's Responsibility for the Work and Materials

Add the following:

The Contractor shall be responsible for marking in the field upon receipt of a USA Call Before You Dig request from the City, the location of the underground facilities installed by the Contractor, until such time as the City accepts in writing, the responsibility for marking the facilities installed by the Contractor. The City shall not be responsible for any damage to the facilities due to Contractor's failure to properly mark the facilities.

SECTION 3.0 PROGRESS OF WORK, MEETINGS, SCHEDULES

GC 3.5 Time of Completion

Add the following:

The successful Bidder, upon becoming the Contractor after having entered into a Contract with the City, shall commence the Work to be performed under the Contract on the date set by the City in the written Notice to Proceed, continuing the Work in accordance with the approved schedule and shall complete the entire Work by and within **85 working days**.

GC 3.11 Construction Schedules

A Type "A" Construction Schedule is required for this project.

GC 3.11.1 Construction Schedule (A)

A. General

Replace entire paragraph with the following:

The schedule shall be submitted as a part of the contract documents before the Pre-construction meeting and must be favorably reviewed by the Construction Manager and the City before the Notice to Proceed is issued. NOTE: The Construction Schedule must include and account for the total contract time specified in the Contract Documents.

GC 3.12.4 Weather Delays

SPECIAL CONDITIONS

Add the following:

In order to be granted a time extension for a weather delay, the contractor must show critical path activities on the project schedule.

GC 3.13, Liquidated Damages

Revise the first paragraph as follows:

Replace every instance of the word “calendar” with “working”.

Add the following:

In case of failure on the part of the Contractor to complete the Work within the limits in subsection 3.5, time of Completion, above, or within such additional time(s) as may be granted by formal action of the City, or the Contractor fails to prosecute the Work or any separable part thereof, with such diligence as will ensure its completion within the time(s) specified in the Contract or any extensions thereof, the Contractor shall pay to the City, as liquidated damages, the sum of \$250 for each working day of delay until such reasonable time as may be required for final completion of the Work, together with any increased costs incurred by the City in completing the Work.

Time stated for completion shall not include the final cleanup and demobilization or work items not critical to the safe function of the project except as otherwise provided in the Special Conditions.

The signing of the proposal by the Bidder shall be prima facie evidence that the Contractor agrees that the amount of liquidated damages is fair and reasonable.

SECTION 4.0 SHOP DRAWINGS AND QUALITY CONTROL/INSPECTIONS

Add the following Subsection:

GC 4.6 Required Submittals

Refer to the technical specifications for required submittals

SECTION 5.0 PAYMENT

GC 5.5 Partial Payments

Add the following paragraph following the 1st paragraph:

A Schedule of Values shall be submitted to the Construction Manager for approval, for all bid items for which the Contractor intends to submit a payment request when the Work included in that bid item is less than 100% complete. The Schedule of Values shall detail the costs for all the items included in the Description of Bid Items and Basis for Payment for the respective bid item. Incomplete or incorrect weekly payroll reports will cause pay requests to be returned.

GC 5.5.1 Partial Payments – Inclusion of Materials on Hand

Add the following:

The following materials are eligible for partial payments:
Metal Building

SPECIAL CONDITIONS

SECTION 7.0 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

GC 7.3.5 Working Hours

The Normal Working Hours for the project will be from (7:00) AM to (5:30) PM, Monday thru Thursday.

GC 7.3.8 Disposal of Material

Add the following to the end of the 1st paragraph:

When disposing of construction waste material outside the City limits, the Contractor shall contact the appropriate local government departments concerning such codes and permits.

GC 7.5 Project Signs

Project signs are not required for this project

SC.4.0 NOTIFICATIONS

SC.4.1 Residential and Commercial Properties

Contractor is responsible to notify all residential and commercial properties that will be affected by the project 72 hours in advance of street work. All commercial business will be delivered 2 notices. One will be for them to keep and one must be signed by a person in office along with address of said business. A sample of the notice must be submitted to the Construction Manager for approval prior to distribution.

SC. 4.2 Fire Department and Sheriff

Contractor shall notify the Carson City Fire Department and Sheriff Department dispatch center at (775) 887-2008 at least twenty-four (24) hours in advance of (approved by CM) rerouting public traffic when traffic patterns are to be altered due to construction operations. Said notification shall set forth the specific traffic patterns to be provided in lieu of the normal routing and the estimated duration of such change(s).

SC. 4.3 School Bus Center

Contractor shall notify the Carson City School Bus center at (775) 283-1950 at least twenty-four (24) hours in advance of (approved by CM) rerouting public traffic when traffic patterns are to be altered due to construction operations. Said notification shall set forth the specific traffic patterns to be provided in lieu of the normal routing and the estimated duration of such change(s).

SC. 4.4 Waste Management

Contractor shall notify Waste Management (Trash Pick-up) at (775) 887-0402 at least twenty-four (24) hours in advance of (approved by CM) rerouting public traffic when traffic patterns are to be altered due to construction operations. Said notification shall set forth the specific traffic patterns to be provided in lieu of the normal routing and the estimated duration of such change(s).

SC. 4.5 Jump Around Carson (JAC) Transit

Contractor shall notify Carson City RTC JAC (Transportation Bus) at (775) 841-7433 at least twenty-four (24) hours in advance of (approved by CM) rerouting public traffic when traffic patterns are to be altered due to construction operations. Said notification shall set forth the specific traffic patterns to be provided in lieu of the normal routing and the estimated duration of such change(s).

SC. 4.6 United States Postal Service

Contractor shall notify United States Postal Service at (775) 884-2300 at least twenty-four (24) hours in advance of construction operations which may affect access for the Postal Service. Said notification shall include specific traffic patterns to be provided in lieu of the normal routing and the estimated duration of such change(s). Contractor shall coordinate with the Postal Service to ensure that mail delivery is not impacted.

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SC 4.7 Ongoing Surface Cleaning

The contractor shall be responsible for maintaining the integrity of all transportation surfaces, both asphalt and dirt, access roads, bike lanes, sidewalks, pathways, gates, etc. Dust, dirt, mud, gravel, etc. carried onto the transportation surface shall be cleaned off on a regular basis (at least once a day or as requested by City personnel). Failure to comply may result in the City having the area cleaned and the cost for the clean-up billed to the contractor.

SC.5.0 Federal Requirements for FTA Funded Projects

SC.5.1 Buy America Iron, Steel, and Manufactured Products

Iron, Steel, and Manufactured products to be permanently incorporated into the work of this federally funded project are subject to the requirements set forth in 49 U.S.C. 5323(j) and 49 C.F.R. Part 661.

SC.5.2 Disadvantaged Business Enterprises requirements

Compliance with 49 CFR Part 26, Participation by Disadvantaged Business Enterprises in Transportation Financial Assistance Programs is required.

SC.6 SPECIAL PROVISIONS

SC.6.1 Construction Coordination with Fleet Services

The Contractor shall coordinate with the Construction Manager in order to construct the new facility and upgrade the existing facility while still allowing maintenance crews use of the existing bays as often as possible.

The owner will occupy the adjacent areas in the same premises during the entire period of construction twenty-four hours a day for the conduct of his normal operation. The Contractor must coordinate his work with the Owner so that minimum interference occurs and shall give 72 hours advance notice to the Owner with regard to temporarily relocating equipment and of necessary interruptions in utility services. Due to limiting conditions of Owner occupancy, in some cases the Owner may not allow full utility shut down. All coordination and notice of shut down shall be directed to the Construction Manager.

At all times during construction for which the Owner is also occupying any portion of the premises, the Contractor must provide and maintain a safe means of ingress and egress for the Owner, his employees, tenants, and all visitors to the occupied portions of the site.

SC.6.2 Description of Bid Items and Basis for Payment

SC.6.2.1 General

Payment for the various items of the Proposal Summary shall be as further specified herein.

The terms "construct, furnish, install, erect, perform, place, prepare, remove or replace" shall mean that the bid item is complete, in place, ready for use and recommended for payment by the Construction Manager. Items of work either specified or inferred, but not included in the tabulation of bid items, shall be considered as included in the price paid for other items of work.

All Work under this Contract shall conform to the requirements of the 2012 edition of the "Standard Specifications for Public Works Construction" (SSPWC), except as modified by these Special Conditions or Technical Specification.

SC.6.2.2 Mobilization, Demobilization and Clean-up

A. Work under this bid item shall consist of mobilization, demobilization, clean-up, permit coordination, and any preparatory Work and operations necessary for the movement of personnel, equipment, supplies and incidentals to the project site before beginning construction. Work under

SPECIAL CONDITIONS

this item shall also include any other item of Work for which other bid items have not been established in this bid schedule.

B. Measurement of this item will be per Lump Sum.

Payment Schedule for partial payments for Mobilization/demobilization and cleanup for all Schedules shall be as follows:

When the monthly partial payment estimate of the amount earned for the respective Schedule, not including these items, is 15% or more of the original Schedule contract amount, then 30% of this item will be included for payment in that, one monthly partial payment estimate.

When the monthly partial payment estimate of the amount earned for the respective Schedule, not including these items, is 50% or more of the original Schedule contract amount, then an additional 30% of this item will be included for payment in that, one monthly partial payment estimate.

When the monthly partial payment estimate of the amount earned for the respective Schedule, not including these items, is 75% or more of the original Schedule contract amount, then an additional 30% of this item will be included for payment in that, one monthly partial payment estimate.

The remaining 10% of these items shall be paid under the final payment provisions.

C. Payment for Mobilization/demobilization and Cleanup will be pro rata as stated above based on the lump sum price named in the Proposal Summary, which price shall constitute full compensation for preparatory Work, construction staking and operations, including but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the project site, for the establishment of the Contractor offices, buildings, and other facilities necessary for the Work, and any other incidentals necessary for doing all the Work involved in mobilizing for the Work. Payment for demobilization and cleanup shall constitute full compensation for record drawings, permit close out and removing all equipment, supplies, debris and offices from the project site.

SC 6.2.3 Fleet Facility Expansion

A. Work under this bid item shall consist of all items shown on the plans as "Base Bid" including but not limited to two additional maintenance bays and one additional bay with a lobby, restrooms, storage, riser room, and open office.

B. Measurement of this item will be per Lump Sum.

C. Payment for Fleet Facility Expansion shall be made at the Unit Price named in the bid response, which price shall constitute full compensation for all work, labor, materials and equipment necessary for a complete installation of all base bid items as shown in the construction documents.

SC 6.2.4 Alternate A – New Trench Drains in Existing Facility

A. The Contractor shall state in his bid an amount as an addition to the Base Bid for furnishing and installing New Trench Drains in the Existing Facility as described in the Construction Documents.

B. Measurement of this item will be per Lump Sum.

C. Payment for Alternate A shall be made at the Unit Price named in the bid response, which price shall constitute full compensation for all work, labor, materials and equipment necessary for a complete installation of Alternate A as shown in the construction documents.

SPECIAL CONDITIONS

SC 6.2.5 Alternate B – Wash Bay with Concrete Aprons

- A. The Contractor shall state in his bid an amount as an addition to the Base Bid for furnishing and installing the Wash Bay with Concrete Aprons as described in the Construction Documents at Grid Line 4 & 5.
- B. Measurement of this item will be per Lump Sum.
- C. Payment for Alternate B shall be made at the Unit Price named in the bid response, which price shall constitute full compensation for all work, labor, materials and equipment necessary for a complete installation of Alternate B as shown in the construction documents.

SC 6.2.6 Alternate C – Upper Level Finishes to Two Offices and Interior Finishes

- A. The Contractor shall state in his bid an amount as an addition to the Base Bid for furnishing and installing Two Offices and Interior Finishes to the Upper Level as described in the Construction Documents.
- B. Measurement of this item will be per Lump Sum.
- C. Payment for Alternate C shall be made at the Unit Price named in the bid response, which price shall constitute full compensation for all work, labor, materials and equipment necessary for a complete installation of Alternate C as shown in the construction documents.

SC 6.2.7 Alternate D – Concrete Aprons on the North and South Side of the New Fleet Facility Expansions at Grid Line 1 Thru 4

- A. The Contractor shall state in his bid an amount as an addition to the Base Bid for furnishing and installing Concrete Aprons on the North and South Side of the New Fleet Facility Expansion at Grid Lines 1 thru 4 as described in the Construction Documents.
- B. Measurement of this item will be per Lump Sum.
- C. Payment for Alternate D shall be made at the Unit Price named in the bid response, which price shall constitute full compensation for all work, labor, materials and equipment necessary for a complete installation of Alternate D as shown in the construction documents.

SC 6.2.8 Alternate E – Demolition of the Existing Interior Two-Story Office/Restroom Wood Structure in the Existing Fleet Maintenance Facility

- A. The Contractor shall state in his bid an amount as an addition to the Base Bid for Demolition of the Existing Interior Two-Story Office/Restroom Wood Structure in the Existing Fleet Maintenance Facility as described in the Construction Documents.
- B. Measurement of this item will be per Lump Sum.
- C. Payment for Alternate E shall be made at the Unit Price named in the bid response, which price shall constitute full compensation for all work, labor, materials and equipment necessary for a complete installation of Alternate E as shown in the construction documents.

SC 6.2.9 Alternate F – Mechanical and Electrical Work in the Existing Building

- A. The Contractor shall state in his bid an amount as an addition to the Base Bid for Demolition of the Existing Interior Two-Story Office/Restroom Wood Structure in the Existing Fleet Maintenance Facility as described in the Construction Documents.

SPECIAL CONDITIONS

Electrical:

Demolition of all electrical components related to two-story structure, interior lighting/controls replacement, egress/emergency lighting, exterior lighting/controls replacement, demolition of telecom server, disconnection of existing mechanical equipment, power distribution, fire alarm, mechanical connections and circuiting.

Mechanical:

The Mechanical scope of work includes installation of MUA-1, VEF-1~5, WEF-1, WEH-1, WH-1 and WH-2 including related ductwork and controls.

The Plumbing scope of work includes the continuation and installation of natural gas, water and drain piping to make-up air unit MUA-1 and the installation of plumbing fixtures WF-1 and EW-1 in the existing building.

The Fire Protection scope of work includes the extension of the fire sprinkler system into the existing building and installing fire sprinklers throughout the existing building.

B. Measurement of this item will be per Lump Sum.

C. Payment for Alternate F shall be made at the Unit Price named in the bid response, which price shall constitute full compensation for all work, labor, materials and equipment necessary for a complete installation of Alternate F as shown in the construction documents.

SC.7 CARSON CITY AMENDMENTS TO THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION 2012 (SSPWC):

Revision No. 1 Through Revision No. 6 - 2/29/2012

The Standard Specifications for Public Works Construction are hereby amended by adding, deleting or amending the following;

SC.7.1 AMENDMENTS TO THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

PART 1 GENERAL PROVISIONS

GENERAL PROVISIONS **100.00-1**

100.01.15 ENGINEER. **100.00-4**

Add the following sentences;

For Work performed under a Contract with Carson City, the Engineer shall be the Construction Manager.

For all other Work performed under a Carson City permit, the Engineer shall be the City Engineer.

Add the following subsection;

100.01.36 APPROVED. When referring to the approved Plans or approved Special Conditions, approved means as approved by the City Engineer.

100.20 BASE LINE, BENCH MARKS AND REFERENCE POINTS **100.00-11**

Delete the wording in it's entirety and substitute the following;

SPECIAL CONDITIONS

The Contractor shall retain a Nevada Licensed Professional Land Surveyor, and the Surveyor or his Subordinates shall stake out the horizontal and vertical positions of all the Work. The Contractor shall satisfy himself as to the accuracy of all measurements before constructing any permanent Work and shall not take advantage of any errors found on the Plans.

100.33 PROTECTION OF PERSON AND PROPERTY.

100.00-15

Add the following sentence;

Any damages to Carson City facilities or utilities shall be immediately repaired by the Contractor at his own expense or by City personnel, as directed by the Engineer, and the Contractor shall be responsible for reimbursing Carson City for any and all Work required to repair or replace damaged facilities or utilities.

100.41 PUBLIC SERVICE EQUIPMENT.

100.00-17

Modify the 1st paragraph;

Add the words "unless otherwise shown on the approved Plans or specified in the approved Special Conditions" to the end of the 2nd sentence.

Add the following sentences to the end of the 2nd paragraph;

Any damages to Carson City facilities or utilities shall be immediately repaired by the Contractor at his own expense or by City personnel, as directed by the Engineer, and the Contractor shall be responsible for reimbursing Carson City for any and all Work required to repair or replace damaged facilities or utilities. Sewer service laterals are owned, operated and maintained by the property owner, and are not marked as a utility by Carson City.

PART 3 CONSTRUCTION METHODS

300.00 CLEARING AND GRUBBING

300.00-1

300.04 PROTECTION OF UTILITIES AND UNDERGROUND FACILITIES.

Add the following sentence;

Any damages to Carson City facilities or utilities shall be immediately repaired by the Contractor at his own expense or by City personnel, as directed by the Engineer, and the Contractor shall be responsible for reimbursing Carson City for any and all Work required to repair or replace damaged facilities or utilities.

END OF SPECIAL CONDITIONS

Specifications

Carson City Fleet Maintenance Facility Expansion

GML Project No. 796

TECHNICAL SPECIFICATIONS

PROJECT MANUAL
Including Specifications
for Construction of

CARSON CITY FLEET MAINTENANCE FACILITY EXPANSION

GML Project No. 796

Prepared By:

GML ARCHITECTS - LLC
1575 Delucchi Lane, Suite 120
Reno, Nevada 89502

Date of Issue:

TECHNICAL SPECIFICATIONS

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Not Applicable

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03200 Concrete Reinforcement
03300 Cast-in-Place Concrete
03345 Concrete Finishing

DIVISION 04

Not Applicable

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DIVISION 06

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TECHNICAL SPECIFICATIONS

SECTION 02201 STRUCTURAL EARTHWORK

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide all site stripping, excavation, fill, backfill, and grading, as specified therein, and as noted on the Drawings.
- B. Related Work: Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.02 QUALITY ASSURANCE

- A. Geotechnical Engineer: The Owner will retain and pay the expenses of a Geotechnical Engineer for performing certain functions specified in the Contract Documents. The Geotechnical Engineer shall communicate only with the Owner and the Architect, and with the Contractor as directed by the Architect. The Architect shall relay any appropriate instructions to the Contractor within the provisions of the Contract Documents.
- B. Testing Agency: Local testing laboratory with a minimum of three years experience in testing soil materials. All reports prepared by the Testing Agency shall be signed by a Professional Engineer registered to practice as a Civil Engineer in the state of Nevada.
- C. Testing laboratory shall have the same required qualifications as the Testing Agency but shall be retained by the Owner. Testing laboratory will make field tests as directed of the "in place" materials to assure conformance with Contract Documents.
- D. Source Quality Control: Prior to delivery to site, the Testing Agency shall test all imported soil material for conformance with Contract Documents. Also on site fill materials shall be approved by the Geotechnical Engineer prior to placing.
- E. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.
- F. Use equipment adequate in size, capacity, and numbers to accomplish the Work of this Section in a timely manner.
- G. In addition to complying with the requirements of governmental agencies having jurisdiction, comply with the directions of the Geotechnical Engineer, as approved by the Architect.
- H. Reference Standards:
 - 1. ASTM - American Society for Testing and Materials.
 - a. D 422 - Particle Size Analysis of Soils.
 - b. D 424 - Plastic Limit and Plasticity Index of Soils.
 - c. D 1556 - Standard Test Method for Density of Soil in Place by the Sand Cone Method.

TECHNICAL SPECIFICATIONS

- d. D 1557 - Standard Test Methods for Moisture-Density Relations of Soils Using 10-pound Rammer and 18-inch Drop.
- e. D 2487 - Classification of Soils for Engineering Purposes.
- f. D 3017 - Moisture Content of Soil and Soil-aggregate in place by Nuclear Methods.

2. State of Nevada, Standard Specifications for Road and Bridge Construction.

1.03 SUBMITTALS

- A. Test Reports: Submit test reports on proposed imported materials, and compaction test reports on all compacted materials.

1.04 JOB CONDITIONS

- A. Existing Conditions:

1. Soils Data: Geotechnical Investigation Report No. 67145001 by Terracon Consultants LLC, dated February 25, 2014.
 - a. The records of investigation or soil or subsurface conditions and logs of test borings are made available by the Architect but are NOT part of the Contract. It is expressly understood and agreed that the Architect assumes no responsibility whatsoever in respect to the sufficiency or accuracy of the interpretations set forth therein and there is no warranty, either expressed or implied, that the conditions indicated by such investigations or records are representative of those existing throughout such areas or any part thereof, or that material other than, or in proportions different from those indicated, may not be encountered.
 - b. The availability or use of the records of investigations of soil or subsurface conditions and/or logs of test borings 1) shall not be construed as a waiver of the Contractor's duty to examine the site of the Work as contemplated and the Contractor is cautioned to make such independent investigations and examinations as he deems necessary to satisfy himself as to the subsurface conditions to be encountered in the performance of the Work and 2) will not relieve the Contractor from the risk of unanticipated soil or subsurface conditions or from properly fulfilling the terms of the Contract for the Contract Sum.
2. Information shown on the Drawings regarding existing site conditions is believed to be correct, but it is not guaranteed. Contractors shall visit the site for necessary information and data regarding present ground levels, ground water level, conditions of property, locations and size of obstructions, and access, etc.
3. Where existing utilities are encountered which are not shown on the Drawings or evident from a site inspection, contact the Architect immediately for instructions. If such lines are inadvertently broken through no fault of the Contractor's operation, they shall be repaired by the Contractor, and an adjustment will be made in payment by the Owner. Breakage of lines shown on the Drawings or evident by a site inspection will be repaired by the Contractor at no increase in Contract Sum.

TECHNICAL SPECIFICATIONS

B. Protection:

1. Provide, and maintain all barricades, shoring, bracing, etc., as required by federal and State codes. Contractor shall assume all responsibility for damage to utilities, streets, etc., that may be caused by this Work.
2. Maintain temporary drainage routes during construction so that rainfall or snow-melt will drain from site and not accumulate or pond.

C. Sequencing, Scheduling and Coordination: The Contractor may schedule and sequence his operations as he desires to optimize the Work of this SECTION.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. For structural fill and backfill use on site or imported materials which are non-expansive conforming to the following: Granular soil, free of organic material and debris and free of clods, lumps and rocks larger than 4-inch diameter. Material shall be reasonably well graded with not more than 35-percent passing a No. 200 sieve, and between 35% - 100% passing a No. 4 sieve, liquid limit – 35 maximum, plastic index – 15 maximum. All material shall be approved by the Geotechnical Engineer prior to delivery and use.
- B. Site non-structural fill may be any on site materials free of debris and rocks larger than 4-inch diameter or imported materials as specified in “A” above.
- C. Drain Rock: Provide clean, crushed 1” minus rock or open graded drain rock, or use a ¾” rock topped with chips to prevent concrete from penetrating the drain rock. Drain Rock materials shall be approved by the Geotechnical Engineer prior to delivery and use.
- D. Aggregate Base for interior concrete slabs, exterior concrete slabs, and sidewalk base: Comply with Nevada Highway Department Type 2, Class B, Aggregate Base.
- E. Moisture Barrier: A moisture barrier shall be provided under all interior slabs on grade unless noted otherwise. It shall be placed directly below the aggregate base. The moisture barrier shall be Mirafi “MCF-1212”, Stego Wrap 15 mil, or approved equal.
- F. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

TECHNICAL SPECIFICATIONS

3.02 PREPARATION

- A. Lay out the building and all site work in conformance with Contract Documents. Establish necessary benchmarks. Protect them and existing benchmarks shown on the Site Plan, until completion of the Work.

3.03 PERFORMANCE

- A. Perform no earthwork during inclement weather, or when excessive moisture is present in the fill material.
- B. Should rainfall or snow-melt occur following footing excavation and prior to pouring footing, dry the excavation thoroughly and recompact the soils below the footing prior to placing footing.
- C. Use no frozen fill. Place no fill on frozen ground.
- D. Remove and replace in-place fills which are frozen prior to the placement of any additional fill.
- E. When rains or snow-melt interrupt fill operations, inspect the surface before more fill is placed to assure that detrimental conditions do not exist.
- F. Excavation:
 - 1. Excavate any existing uncontrolled fill from under the building and the exterior concrete aprons. The depth of the existing uncontrolled fill shall be assumed to be 4'-0". This excavation shall extend a minimum of 5'-0" beyond the exterior building lines, and a minimum of 2'-0" beyond exterior apron slabs. Excavate as detailed and as necessary to obtain required subgrade elevations and to allow for a minimum of two feet of engineered fill to be placed under the bottom of all footings and under the base of all interior floor slabs. At exterior concrete apron slabs excavate as necessary to allow for a minimum of two feet of engineered fill to be placed under the bottom of the base for these slabs.
 - 2. Excavate as necessary to allow room for placement and removal of foundation formwork.
 - 3. Form all footings with wood, metal, or earth forms as specified in SECTION 03100, "CONCRETE FORMWORK."
- G. Compaction of Exposed Soils: The soils exposed by excavations, which are to receive compacted fill or footings, shall be scarified, watered or dried as necessary to obtain the proper moisture content as directed by the Geotechnical Engineer, and compacted to a depth of 8", to at least 90-percent of maximum dry density. If, in the opinion of the Geotechnical Engineer, the existing soils at the bottom of the footing excavations are at 90-percent of maximum dry density or above, then these soils may not require scarification and recompaction, as determined by the Geotechnical Engineer.
- H. Fill and Backfill:
 - 1. Fill as required to obtain required subgrades.
 - 2. Backfill foundations and stemwalls.

TECHNICAL SPECIFICATIONS

3. Place fill and backfill materials in 8-inch thick maximum loose layers. In general, place in horizontal layers extending uniformly over the area to be filled. Compact each layer as specified prior to placing the subsequent layer.
4. Water or dry fill materials as necessary to obtain the proper moisture content as directed by the Geotechnical Engineer. These soils shall then be compacted to the following minimum densities, based on ASTM D1557 Method A or C.
 - a. Structural fill - at least 95-percent dry density for fills under footings or slabs on grade, whether interior or exterior.
 - b. Non-structural fill on site - 90-percent minimum dry density.

I. Moisture Barrier:

1. Where moisture barrier is required by the drawings, (under all interior slabs), place moisture barrier beneath the aggregate base.

J. Aggregate Base:

1. Provide the aggregate base placed on top of the moisture barrier membrane and compact to at least 95 percent under pavement and other exterior and interior slabs. Also compact the upper 8" of subgrade below this base to 95 percent relative compaction.
2. Establish finish grade of base at the required elevation with a level uniform surface varying not more than 1/2-inch when measured in any direction with a 10-foot straight edge.
3. Compact drainrock by two passes at right angles with an approved vibratory compactor.

K. Site Grading:

1. After completion of all excavation, fill and backfill, rake surface to a 4-inch depth to remove all rocks and debris in excess of 2-inches in diameter. Remove this material from the site.
2. Grade all areas including excavated and filled sections and transition areas to obtain a finished surface, reasonably smooth, compacted, and free from irregular surface changes. Leave all ditches, swales, and gutters finished to drain readily.

3.04 FIELD QUALITY CONTROL

- A. Soil Compaction Test: The Owner will pay the testing Laboratory for the first compaction test at any test location. All retests required because fill materials were not compacted to the required density shall be paid for by the Contractor.
- B. The Geotechnical Engineer shall review all sitework and footing excavations before any concrete is cast, and submit a letter of compliance to the Architect. The Geotechnical Engineer shall review all backfill materials prior to placement and observe backfill operations. A letter of compliance shall be submitted to the Architect stating that fills have been constructed per the requirements of these Specifications.

TECHNICAL SPECIFICATIONS

- C. Provide at least the following tests to the approval of the Geotechnical Engineer:
 - 1. At paved areas, at least one (1) field density test for every 4000 sq. ft. of paved area, but not less than three (3) tests.
 - 2. In each compacted fill layer, one (1) field density test for every 4000 sq. ft. of overlaying area, but not less than three (3) tests.
- D. If, in the Geotechnical Engineer's opinion, based on reports of the testing laboratory, subgrade or fills have been placed below specified density, provide additional compacting and testing.

3.05 MAINTENANCE

- A. Protection of newly graded areas:
 - 1. Protect newly graded areas from traffic and erosion, and keep free from trash and weeds.
 - 2. Repair and reestablish grades in settled, eroded, and rutted areas to the specified tolerances.
- B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape, and compact to the required density prior to further construction.

END OF SECTION 02201

TECHNICAL SPECIFICATIONS

SECTION 03100 CONCRETE FORMWORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. General Requirements:

1. Drawings and general provisions of the Contract Documents including General, Special and other Conditions and Division 1, "General Requirements" Sections, apply to the work specified in this Section.

B. General Scope of Work:

1. Provide formwork and accessories in accordance with provisions of this Section for cast-in-place concrete shown on the Drawings or required by other Sections of these Specifications.

C. Related work:

1. Section 03200: Concrete reinforcement.
2. Section 03300: Cast-in-place concrete.

1.02 QUALITY ASSURANCE

- ##### A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

- ##### B. Design of formwork is the Contractor's responsibility.

C. Standards:

1. Concrete work shall comply with the requirements of ACI 301, "Specifications for Structural Concrete for Buildings", latest edition.
2. Items not otherwise specified shall comply with ACI Standard 347, "Recommended Practice for Concrete Formwork", latest edition.

D. Allowable Tolerances in Formwork:

1. Construct formwork to provide completed cast-in-place concrete surfaces complying with the tolerances specified in ACI 347.
2. Before concrete placement, check the lines and levels of erected formwork. Make corrections and adjustments to ensure proper size and location of concrete members and stability of forming systems.
3. During concrete placement, check formwork and related supports to ensure that forms are not displaced and that completed work will be within specified tolerances.

TECHNICAL SPECIFICATIONS

4. Refer to Structural Drawings for additional requirements.

E. Inspections:

1. See drawings and general provisions of the Contract Documents including General, Special and other Conditions and Division 1, "General Requirements" Sections, apply to the work specified in this Section.
2. See requirements for inspection as stated in Part 3 of this section.

1.03 SUBMITTALS

- A. Submit manufacturer's specifications and installation instructions for products specified. Include manufacturer's certification as may be required to show compliance with these specifications.

1.04 JOB CONDITIONS

A. LOADING STRUCTURES

1. Protect all in-place structures from excessive loading.
2. Shore and brace as necessary to prevent all damage.

B. SCHEDULING

1. Contractor shall provide and erect sufficient forms so that the work of placing concrete will proceed at a rate to insure maintaining a schedule so that the time of the inspector shall be as continuous as practicable.

PART 2 - PRODUCTS

2.01 MATERIALS

A. GENERAL

1. Except for metal forms, use new materials. Materials may be re-used during progress of the Work, provided they are completely cleaned and reconditioned, recoated for each use, and capable of producing formwork of the required quality.

B. EARTH FORMS

1. Side forms for footings may be omitted, and concrete may be placed directly against excavation, only when requested by Contractor and approved by Architect, in writing. The Architect shall be the sole authority for making this approval.
2. When omission of forms is accepted, provide additional concrete 1" on each side of the minimum design profiles and dimensions shown on Structural Drawings.

C. FORM MATERIALS

1. Plywood:

TECHNICAL SPECIFICATIONS

- a. APA Exterior "B-B" "Plyform" grade Douglas Fir veneer panel with medium density overlaid one side grade; sound, undamaged sheets with clean, true edges; conform to Product Standard PS 1. Use for all exposed concrete surfaces.
- b. Panel thickness and placing as required to support concrete in accordance with referenced standards; minimum $\frac{3}{4}$ " thickness.
- c. All panels edge sealed; Both faces of general use panels shall be factory sealed with colorless coating which will not affect application of applied finishes or protective coatings; form oil not permitted.

2. Lumber for Forms:

- a. For concealed concrete surfaces including footings and foundations, use "Standard" or better grade Douglas Fir, T&G or shiplap, surface 1 side, 2 edges, not wider than 8", secured to wood or steel stakes, substantially constructed to shapes indicated and to support the required loads.
- b. For studs, wales, and supports, use S4S surfaced "Standard" or better grade Douglas Fir lumber, dimensions as required to support the loads, but not less than 2x4 inch size.

3. Flat Steel Forms:

- a. Approved type steel forms may be used in lieu of wood and plywood, at the Contractor's option.

4. Tube Forms:

- a. For round columns furnish fiber, fiberglass, or metal tube forms of diameters required, capable of withstanding continuous pour full height and providing a finished surface free of spiral markings.

D. ACCESSORIES

1. Form Ties:

- a. Removable form bolts with coil ties, or snap ties.
- b. Either system shall have cone spreaders and tie metal shall be $\frac{3}{4}$ " minimum back of concrete face.
- c. As manufactured by Superior Concrete Accessories, Burke, Richmond, or approved equal.

2. Screed Chairs:

- a. Approved type for slab screeds.

3. Chamfer Strips:

- a. Wood or PVC strips, $\frac{3}{4}$ x $\frac{3}{4}$ inch size of maximum possible lengths.

4. Control Joints:

- a. For interior slabs, where not otherwise provided by saw cutting, furnish Greenstreak Plastic Products "Zipcap Control-joint Former", or approved, minimum 10-foot lengths, 1" depth for installation in new interior slabs.

TECHNICAL SPECIFICATIONS

5. Expansion Joints:

- a. For Interior Slabs: Meadows "Seal Tight" self-expanding cork, ½" thick by depth of slab less ¼", conforming to ASTM D1752, Type 3 (AASHTO M153-Type II), or approved equal.

6. Waterstops:

- a. Polyvinyl chloride, minimum 1,750 psi tensile strength, minimum 50° F to plus 175° F working temperature range, 4" wide, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing; manufactured by Greenstreak, or approved equal.

7. Nails, Spikes, Lag Bolts, Thru-Bolts, Anchorages:

- a. Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

8. Joint Sealant:

- a. As specified in Section 03300.

E. TREATMENT OF FORMS

1. Furnish W. R. Meadows, Inc. "Sealtight Duogard", Nox-crete Chemical "Nox-crete Form Coating", Sternson Ltd. "CRA", or Old North Mfg. Co. Inc. or Sonneborn-Contech or Metalcrete Industries equivalent chemical release agent, as approved, guaranteed as non-staining and not impairing bond of paints or other coatings.
2. Form release agent may be factory-applied provided release agent conforms to these requirements; form oil not permitted.

2.02 DESIGN OF FORMWORK

A. General:

1. Design formwork so it will safely support vertical and lateral loads that might be applied. Design forms and falsework to include factors pertinent to safety of the structure during construction.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with Drawings.
- B. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

TECHNICAL SPECIFICATIONS

3.02 INSTALLATION

A. General:

1. Install concrete work in accordance with ACI 301 except as amended by this Section.

B. Earth Forms:

1. Where permitted, hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

C. Construction - Formwork:

1. General:

- a. Construct formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 347. Construct so concrete members and structures are of correct sizes, shapes, lines, and dimensions shown, and as required to obtain accurate alignment, location, grades, level, and plumb work in the finished structure.
- b. Make reasonably tight to prevent excess leakage of cement paste during concrete placement. Solidly butt joints, and provide backup material at joints as required to prevent leakage and prevent fins. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to over-stressing by construction loads.
- c. Set form board and plywood for walls horizontally; keep form joints to a minimum.
- d. Provide for openings, offsets, keyways, recesses, moldings, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts, and other features as required.
- e. Remove debris and clean out forms before pouring any concrete.
- f. Keep forms moist prior to pour to prevent shrinkage and warping.
- g. Do not damage concrete during stripping. Permit removal of remaining principal shores.

2. Fabrication:

- a. Fabricate forms for easy removal without hammering or prying against concrete surfaces.
- b. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.
- c. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and assure ease of removal.
- d. Locate studs and joists not farther apart than 12 inches o.c. Horizontal form wales spaced not to exceed 2 feet o.c.

3. Form Ties:

- a. Hold inner and outer forms for vertical concrete together with combination steel ties and spreaders as approved by Architect.
- b. Space wall form ties not over 4 feet apart horizontally and 2 feet apart vertically. Space ties symmetrically in tiers and rows, each tier plumb from top to bottom and each row level. Form tie placement in formed walls where wall surface will be left exposed in the finished work, shall be uniformly spaced and aligned within the following tolerance:

TECHNICAL SPECIFICATIONS

Tie alignment, horizontally and vertically along each wall plane, shall occur no more than ¼" from a straight line measured between first and last tie along any line, and no more than ¼" variance in alignment between any to adjacent ties.

- c. At horizontal pour lines, locate ties not more than 6" below the pour lines. Tighten after concrete has set and before the next pour is made.
 - d. For exposed concrete surfaces, install form ties of removable type with she-bolts equipped with permanent plugs and a system approved by Architect for fixing the plug in place.
4. Forms for Exposed Concrete:
- a. Drill forms to suit ties being used, and to prevent leakage of cement paste around the holes. Do not splinter forms by driving ties through improperly prepared holes.
 - b. Provide sharp clean corners at intersecting planes, without visible edges or offsets. Back joints with extra studs or girts to maintain true, square intersections.
 - c. Use extra studs, wales, and bracing to prevent objectionable bowing of forms between studs, and to avoid bowed appearance in concrete. Do not use narrow strips of form material which will produce bow.
5. Column Forms:
- a. For square or rectangular columns, use 2" thick planks or joists, surfaced one side and two edges; or use metal forms.
 - b. For round columns, use tube forms as specified above, which will impart a smooth architectural finish as directed and approved by Architect.
 - c. Construct column forms with tight joints and securely clamped together with steel clamps.
6. Corner treatment:
- a. Chamfer salient corners in exposed concrete unless otherwise noted or where flush with adjacent surfaces. Unless shown otherwise, form chamfers with 3/4" x 3/4" strips, accurately formed and surfaced to produce uniformly straight lines and tight edges.
 - b. Extend terminal edges to required limit, and miter the chamfer strips at changes in direction.
7. Provisions for Other Trades:
- a. Provide openings in concrete formwork to accommodate work of other trades.
 - b. Verify size and location of openings, recesses, and chases with the trade requiring such items.
 - c. Accurately place and securely support items to be built into the concrete.
8. Re-use of Plywood:
- a. Plywood forms may be reused provided damaged edges are removed, imperfections in faces are repaired and holes filled and plywood is cleaned to obtain concrete surfaces equal to that obtained by new plywood.

TECHNICAL SPECIFICATIONS

D. TREATMENT OF FORMS

1. Before placing the concrete, the contact surfaces of forms shall be coated with a suitable non-staining form coating compound or shall be given two coats of nitrocellulose lacquer. Mineral oil shall not be used on forms.
2. Excess coating shall be removed by wiping with cloths. Re-used forms shall have the contact surfaces cleaned thoroughly, those which have been coated shall be given an additional application of the coating.
3. Apply form coating material in strict accordance with manufacturer's recommendations.

E. MISCELLANEOUS EMBEDDED ITEMS

1. Anchor Bolts:
 - a. Set as required on the drawings.
2. Inserts, Sleeves, Conduit and Similar:
 - a. Allow all trades time and facilities to install.
 - b. Conform to Section 503 of ACI Building Code and the International Building Code.
 - c. General Contractor shall furnish and install all sleeves and frames for openings shown on drawings or required for equipment, except those sleeves specified under the Mechanical and Electrical Work.
3. Bolt Inserts:
 - a. Shall be of threaded type to receive standard machine bolt.
 - b. Size 5/8" unless larger size is indicated on the drawings.
4. All Other Miscellaneous Items:
 - a. Build-in items specified in other Sections exactly where shown.
 - b. Verify locations which may be critical.

F. JOINTS AND STOPPAGES

1. Construction Joints:
 - a. Install in accordance with ACI 318 and as specified herein, located where indicated or otherwise required and approved as to not impair strength of structure.
 - b. Provide nominal 3/4" x 2-1/2" key at construction joints, unless otherwise shown on drawings, or as directed by Structural Engineer.
 - c. Make joints perpendicular to principal reinforcement. Continue half reinforcement and mesh across joints except at isolation joints; provide longitudinal keys at least 1-1/2" deep at all joints in walls and between walls and slabs or footings.
 - d. Remove key-forming wood inserts and thoroughly clean surface of concrete at all joints, removing all laitance, before placing next lift.
 - e. Immediately prior to placing next lift and/or adjacent slab, dampen hardened concrete of joint surface and coat with neat cement mortar of similar proportions to mortar in concrete.
2. Expansion Joints:

TECHNICAL SPECIFICATIONS

- a. Do not extend reinforcement through where bonded on both sides of joint; smooth dowels may extend through joint. Position accurately and support against displacement in locations listed hereinafter.
- b. Interior Work:
 - i. Install isolation/expansion joints between interior ground-supported slabs and building foundation walls when shown on Drawings, and at other locations where specifically shown or noted.
 - ii. Install joints with top surface recessed below finish elevation $\frac{1}{4}$ ", and fill with joint sealer as specified in Section 03300, finished flush with slab surface.
- c. Exterior Work:
 - i. Install as required in new walks and slabs in locations and/or spacings shown, elsewhere not more than 15 feet apart. Coordinate exact locations and alignment with Architect.
 - ii. Install expansion joints between concrete walks/slabs and vertical building walls and retaining walls.
 - iii. Install at all other locations indicated.
 - iv. Install joints with top surface recessed below finish elevation $\frac{1}{4}$ ", and fill with joint sealer as specified in Section 03300, finished flush with slab surface.

3. Control Joints:

- a. Provide as detailed and in locations indicated, accurately placed to true straight lines and supported against displacement.
- b. For exterior work, form with edging tool as specified in Section 03300.
- c. For interior work, build control strips into forms or diamond-saw cut joints $\frac{1}{8}$ " wide by $\frac{1}{5}$ the depth of the slab.
 - i. If saw cut method is used, saw cutting shall be performed as soon as the concrete hardens sufficiently to prevent raveling of the concrete at the edges and before the concrete temperature is permitted to fall; perform cuts 4 – 8 hours after concrete is placed, as soon as the freshly placed concrete can be walked on.
 - ii. Contractor shall have at least one spare saw available during the saw cutting operation.

G. REMOVING FORMS AND SHORING

Conform to the following, unless specified otherwise in Structural Notes.

1. Ties:

- a. Remove 4 days after pour. Fill holes with dry pack cement mortar as specified in Section 03300.

2. Forms:

- a. Remove only after concrete has thoroughly hardened. Vertical forms may be removed 24 hours after pour where structure is supported on shores. Remove other forms no sooner than 7 days.

3. Shoring:

- a. Remove shoring only on approval of Engineer but not before 28 days.
- b. Shoring is required for any reinforced concrete structural component, except concrete slabs supported by structural steel framing.
- c. Shoring for beams and slabs shall remain in place at all ties until all concrete work over has been completed; if necessary to remove any shoring in order to remove

TECHNICAL SPECIFICATIONS

plywood forms, shoring so removed shall immediately be reinstalled to support all loads.

4. Finished Surfaces:

- a. Exercise care in removing forms from finished concrete surfaces so that surfaces are not marred or gouged, and that corners are true, sharp, and unbroken.
- b. Release sleeve nuts or clamps, and pull the form ties neatly.
- c. Do not permit steel spreaders, form ties, or other metal to project from, or be visible on, any concrete surface except where so shown on Drawings.

3.03 FIELD QUALITY CONTROL

A. INSPECTIONS

1. Testing will be performed as required by International Building Code, as adopted by local jurisdiction, and these Specifications.
2. Inspections of formwork shall include configuration, form, and steel cleanliness.
3. Inspect erected formwork for conformance with approved drawings, for design and seal of form joints, and for type and location of form ties.

END OF SECTION 03100

TECHNICAL SPECIFICATIONS

SECTION 03200 CONCRETE REINFORCEMENT

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Work included: Drawings and general provisions of the Contract Documents including General, Supplemental and other Conditions and Division 1, “General Requirements” Sections, apply to the work specified in this Section.
- B. Related work:
 - 1. Section 03100: Concrete formwork.
 - 2. Section 03300: Cast-in-place concrete.

1.02 QUALITY ASSURANCE

- A. Comply with the pertinent provisions of the latest edition of the following, except as may be modified herein.
 - 1. ACI 318 “Building Code Requirements for Reinforced Concrete”, hereinafter called “ACI 318”.
 - 2. ACI 315 “Manual of Standard Practice for Detailing Reinforced Concrete Structures”, hereinafter called “ACI 315”.
 - 3. Concrete Reinforcing Steel Institute (CRSI) “Manual of Standard Practice”.
- B. Inspections: Drawings and general provisions of the Contract Documents including General, Supplemental and other Conditions and Division 1.
- C. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work in this Section.

1.03 SUBMITTALS

- A. Provide verification and certification that the concrete supplied for this project was manufactured and fabricated so as to comply with the “Buy America” requirements.
- B. SHOP DRAWINGS
 - 1. The Contractor shall submit to the Architect, for review, complete and reviewed, reinforcing steel bending and placing diagrams prepared by or under the supervision of a qualified steel detailer; prepare in accordance with ACI 315.
 - 2. Shop drawings shall show details, dimensions and schedules for the fabrication and placing of reinforcing and accessories. Fabrication of items shown in shop drawings shall not begin until Architect has completed his review.

TECHNICAL SPECIFICATIONS

3. Include materials list of items proposed to be provided under this Section, together with manufacturer's specifications and other data needed to prove compliance with specified requirements.
4. Shop drawings are interpretations of and are supplemental to the design drawings and specifications. Their intent is to demonstrate to the Architect that this Contractor has understood the design concept, and to provide the detailed information necessary for the fabrication, assembly and installation of the products or materials specified. Neither the shop drawings nor comments placed on them by the Architect shall be construed as being change orders.

PART 2 – PRODUCTS

2.01 MATERIALS: All materials for this project shall comply with "Buy America" requirements.

A. BAR REINFORCING STEEL

1. Unless otherwise specifically noted in Structural Notes, furnish deformed bars meeting requirements set forth in ASTM A615 minimum, Grade 60. Bars shall be unpainted, uncoated, and free from rust, dirt and loose scale.
2. Where reinforcing requires welded connections, furnish weldable reinforcing bars which meet the chemical requirements of ASTM A706 (Grade 60 ksi) with a minimum carbon equivalent of .55 percent.

B. WELDED STEEL WIRE FABRIC

1. Furnish welded wire fabric meeting requirements set forth in ASTM A185 and A82, Fy=65 ksi.

C. FIBROUS SECONDARY REINFORCEMENT

1. General:
 - a. Use in all standard weight concrete mixes for interior and exterior slabs on grade.
 - b. Acceptable fibrous secondary reinforcement for slabs shall be filamentized nylon or polypropylene fiber which is inert to alkali and chemical attack; fiberglass fibers are not acceptable.
2. Length:
 - a. As recommended by fibrous reinforcing manufacturer; ranging between $\frac{1}{2}$ " to $\frac{3}{4}$ ".
3. Acceptable Products/Manufacturers:
 - a. "Nycon" as manufactured by Nycon Inc.
 - b. "Fibermesh" as manufactured by Fibermesh Co.
 - c. "Microfiber" as manufactured by W. R. Grace.

TECHNICAL SPECIFICATIONS

D. ACCESSORIES

1. General:

- a. Use wire bar type supports complying with CRSI recommendations, unless otherwise shown on Drawings. Do not use wood, brick, or other non-complying material.
- b. For slabs on grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
- c. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with either hot-dip galvanized, plastic-protected legs, or stainless steel. In addition, portions of all accessories within $\frac{3}{4}$ " of the concrete surface for painted or unpainted exposed concrete surfaces shall be stainless steel and bars shall be tied with stainless steel wire, whether for exterior or interior exposure.

2. Tie Wire:

- a. 16 gauge or heavier, double annealed wire.

3. Spacer Bars for Wall Reinforcing:

- a. No. 3 bars, "U" shaped. Stock items of equivalent function may be submitted for approval.

4. Mortar Blocks:

- a. Furnish as required for use as spacers in placing reinforcement; shall be 2" square (maximum).
- b. Mortar blocks shall be constructed of mortar mixed with the same proportions of sand and cement used in concrete, and develop a minimum compressive strength of 4,000 psi at 28 days.
- c. Mortar blocks shall have a tie wire embedded and the protruding ends to be tied to the reinforcing steel to hold the mortar blocks in place; mortar blocks with a grooved top may be used for supporting steel in slabs.
- d. Do not use wood, brick, or other non-complying material.

5. Metal Chair Supports:

- a. In lieu of mortar blocks, furnish approved heavy-duty plastic-type chair supports, sized to support all slab steel to proper height and with cushioned pads to prevent vapor barrier membrane penetration.

2.02 FABRICATION

A. General:

1. Fabricate reinforcing bars to conform to the required shapes and dimensions, with fabrication tolerances complying with the CRSI Manual.
2. In case of fabricating errors, do not straighten or rebend reinforcement in a manner that will weaken or injure the material.

TECHNICAL SPECIFICATIONS

3. Reinforcement with any of the following defects will not be acceptable.
 - a. Bar lengths, depths, and/or bends exceeding the specified fabrication tolerances;
 - b. Bends or kinks not shown on the Drawings;
 - c. Bars with reduced cross-section due to excessive rusting or other cause.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Hooks & Bends:

1. Minimum Bend Diameter: The diameter of bend measured on the inside of the bar for standard hooks, other than stirrup and tie hooks, not less than:

<u>Bar Size</u>	<u>Minimum Diameter</u>
#3 through #8	6 bar diameters
#9 through #11	8 bar diameters

2. Field bending of reinforcing bars, unless specifically noted on the Plans, will not be allowed. If bars are found to be field bent, especially brittle grade 60 bars, the Contractor will be responsible to provide corrective measures as directed by the Architect.

B. Cleaning Reinforcement:

1. Clean reinforcement, at time concrete is placed, free of mud, oil, or other materials that will reduce the bond. Conform to ACI 318.

C. Placing & Fastening Reinforcement:

1. General:

- a. Conform to ACI 318.
- b. Prevent water from softening soil under reinforcing during steel placing.
- c. Conform to ACI 318 for placing, supports, tolerances, and draped fabric, unless noted otherwise on Drawings.

2. Placement:

- a. Place reinforcement as shown on Drawings.
- b. Accurately position in accordance with shop drawings; support and tie intersections in accordance with best practices and as necessary to secure reinforcement and prevent displacement by formwork, construction, or concrete placement operations.
- c. Locate and support reinforcing by metal chairs or mortar blocks as required; wood or foam supports are not acceptable.

TECHNICAL SPECIFICATIONS

- d. Reinforcing bars may be relocated as necessary to avoid interference with other reinforcement, conduit, or other embedded items.
- e. If any reinforcing bar is moved a distance exceeding one bar diameter of the specified placing tolerance, the resulting rearrangement of the reinforcement shall be subject to acceptance by the Structural Engineer.
- f. Reinforcement to maintain minimum concrete coverage as shown.

3. Fastening:

- a. Securely tie bars and bar supports together with 16 gauge wire to hold reinforcement accurately in position during concrete placement.
- b. Set wire so that ends are directed into the concrete.
- c. Wire tie stirrups and ties to main reinforcement.

4. Supports:

- a. General: Provide sufficient number of supports and of strength to carry the reinforcement. Do not place reinforcing bars more than 2 inches beyond last leg of any continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.
- b. On ground: Use concrete block.
- c. Over Formwork: In unexposed areas use concrete block or metal chairs. In exposed slabs and similar conditions use approved "invisible" metal chairs, hot-dip galvanized or approved plastic type.

D. SPACING OF BARS

1. Space reinforcing bars to comply with ACI 318 unless otherwise noted on Drawings. In conformance with placement requirements specified above, reinforcing bars may be relocated as necessary to avoid interference with other reinforcement, conduit, or other embedded items.

E. SPLICES IN REINFORCEMENT

1. CRSI standard by lapping ends, placing bars in contact, and tightly wire tying or by welding in an approved manner, except as noted otherwise. Do not splice bars except at locations shown on Drawings, except as otherwise specifically approved by Structural Engineer.
2. All welding to conform to "Recommended Practice for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete" of the American Welding Society (AWS D 12.1), performed in accordance with AWS D1.4.
3. All reinforcing bars requiring hooks: The minimum "Standard Hook" and leg extension, except as otherwise noted.
4. Splice in a manner developing at least 125% of the yielding strength of the bar.

TECHNICAL SPECIFICATIONS

F. SHRINKAGE & TEMPERATURE REINFORCEMENT

1. Conform to ACI 315 for reinforcement for shrinkage and temperature stresses normal to principal reinforcement where same is placed in one direction only.

G. CONCRETE PROTECTION FOR REINFORCEMENT

1. Conform to Structural Drawings and ACI 318.

H. STEEL DOWELS

1. Provide dowel bars where shown or required for connecting to in-place or subsequent work as shown.

I. PLACING WELDED WIRE FABRIC

1. Install in all concrete slabs on grade, except slabs where bar reinforcing is indicated; provide sizes specified herein or otherwise indicated, and with minimum coverages indicated for concrete protection.
2. Install welded wire fabric in as long lengths as practicable.
3. Lap adjoining pieces at least 12" or one full mesh spacing plus 2", whichever is greater, and lace splices with 16 gauge wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.
4. Do not carry through expansion joints.

J. FIBROUS SECNDARY REINFORCEMENT

1. For all standard weight slabs on grade add fibrous reinforcing to concrete mix at the batch plant, at manufacturer's recommended rate per cubic yard of standard weight and lightweight concrete mixes, and in strict accordance with fiber manufacturer's printed instructions.

END OF SECTION 03200

TECHNICAL SPECIFICATIONS

SECTION 03300 CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION

- A. WORK INCLUDED: Drawings and general provisions of the Contract Documents including General, Supplementary and other Conditions and Division 1, "General Requirements" Sections, apply to the work specified in this Section.
- B. RELATED WORK
 - 1. Section 03100: Concrete formwork.
 - 2. Section 03200: Concrete reinforcement.
 - 3. Section 03345: Concrete finishing.
- C. COORDINATION
 - 1. Coordinate all installation under this Section with work of other trades.

1.02 QUALITY ASSURANCE

A. GENERAL

- 1. Concrete shall conform to all provisions of the latest edition of the (ASTM) American Society for Testing and Materials and the (ACI) American Concrete Institute noted within this specification, except as modified by the Supplemental Requirements contained herein.
- 2. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- 3. Preinstallation (or Preconstruction) Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination".

B. STANDARD SPECIFICATIONS

- 1. Conform to ACI Specifications for Structural Concrete for Buildings (ACI 301-2002) hereinafter called "ACI 301".
- 2. Conform to ACI 302 "Guide for Concrete Floor and Slab Construction".
- 3. Conform to ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete".
- 4. Conform to ACI 306R "Recommended Practice for Cold Weather Concreting"; conform to ACI 305R "Recommended Practice for Hot Weather Concreting".
- 5. Conform to ACI 308 "Standard Practice for Curing Concrete".

TECHNICAL SPECIFICATIONS

6. Conform to ACI 318 "Building Code Requirements for Reinforced Concrete".
7. Unless otherwise shown or specified, design, construct, erect, maintain, and remove forms and related structures for cast-in-place concrete work in compliance with the American Concrete Institute Standard ACI 347, "Recommended Practice for Concrete Formwork".

C. QUALITY CONTROL

1. Do not commence placement of concrete until mix designs have been reviewed and approved by the Architect and all governmental agencies having jurisdiction, and until copies are at the job site, and the batch plant. Also, no concrete shall be placed until the Contractor has secured the Architect's approval of the completed reinforcement placement.
2. See drawings and general provisions of the Contract Documents including General, Supplementary, and other Conditions and Division 1. Also see other requirements for testing as stated in Part 3 of this Section; conform to requirements, therefore, and furnish materials for tests. Give inspector full cooperation.

D. NOTICE OF INTENTION TO PLACE CONCRETE

1. Notify Architect, Structural Engineer, and Special Inspector at least 48 hours prior to an intended pour.

1.03 SUBMITTALS

A. SUBMIT

1. Submit list of all items proposed to be provided under this Section together with manufacturer's product data and installation instructions for all such proprietary materials.
2. Submit product data and manufacturer's instructions for all required products.

B. Provide the following submittals in accordance with ACI-301:

1. Admixture certification. Chloride ion content must be included.
2. Aggregate certification.
3. Concrete mix design. Submit a mix design for each strength and type of concrete. Clearly indicate where each mix design will be used.
4. Construction and control joints not shown on drawings.
5. Materials and methods for curing (per Section 03345).
6. Laboratory tests on concrete.

TECHNICAL SPECIFICATIONS

1.04 JOB CONDITIONS

A. WINTER CONCRETING

1. Provide adequate equipment for heating materials and protecting concrete during freezing or near-freezing weather.
2. Keep all materials, reinforcement, forms, and ground in contact with concrete, free from frost; use no materials containing ice.

B. HOT WEATHER CONCRETING

1. Take steps to reduce concrete temperature and water evaporation by proper attention to ingredients, production methods, handling, placing, protecting and curing.

C. LOADING STRUCTURES

1. Protect all in-place structures from excessive loading. Shore and brace as necessary to prevent all damage.

D. FIELD REFERENCE MANUAL

1. A copy of ACI SP-15 "Field Reference Manual" which includes ACI 301 shall be kept in the Contractor's Field Office at all times.

PART 2 - PRODUCTS

2.01 FORM MATERIALS

- A. Provide in accordance with Section 03100 for all work of this Section.

2.02 CONCRETE MATERIALS

A. PORTLAND CEMENT

1. Provide a standard brand of Portland cement complying with ASTM C150, Type II, or Type I-P, low alkali. Do not change the brand of cement during progress of the Work except as approved in writing by the Architect.

B. AGGREGATE

1. General

- a. Provide hardrock aggregate complying with ASTM C33, with additional attributes specified herein.
- b. For making grading tests of fine and coarse aggregate, use square mesh wire cloth complying with ASTM E11.

2. Fine aggregate

- a. Provide washed natural sand having strong, hard, durable particles, and containing not more than 2% by weight of deleterious matter such as clay lumps, mica, shale, or schist.

TECHNICAL SPECIFICATIONS

- b. Grade from coarse to fine within the following limits:

Sieve size:	Percentage by weight passing sieve:	
	Minimum:	Maximum:
3/8"	100	---
No. 4	95	100
No. 8	65	95
No. 16	45	75
No. 30	30	50
No. 50	10	22
No. 100	2	8

3. Coarse aggregate

- a. Provide coarse aggregate consisting of clean, hard, fine grained, sound crushed rock or washed gravel, or a combination of both, containing not more than 5% by weight of flat, chip-like, thin, elongated, friable, or laminated pieces, nor more than 2% by weight of shale or cherty material. Any piece having a length in excess of five times the average thickness shall be considered flat or elongated.
- b. Use coarse aggregate of the largest practicable size for each condition of placement, subject to the following maximum size limitations: Do not exceed 3/4 of the clear distance between reinforcing bars 1/5 of the narrowest dimension between sides of forms, or 1/3 the depth of any slab section.
- c. Grade combined aggregates within the following limits:

Sieve size or size in inches:	Percentage by weight passing sieve:					
	1-1/2" aggregate:		1" aggregate:		3/4" aggregate:	
	Min:	Max:	Min:	Max:	Min:	Max:
1-1/2"	95	---	---	---	---	---
1"	75	90	90	100	---	---
3/4"	55	77	70	90	90	100
3/8"	40	55	45	65	60	80
No. 4	30	40	31	47	40	60
No. 8	22	35	23	40	30	45
No. 16	16	30	17	35	20	35
No. 30	10	20	10	23	13	23
No. 50	2	8	2	10	5	15
No. 100	0	3	0	3	0	5

C. WATER

1. Use only water which is clean and free from deleterious amounts of acid, alkali, salt, and organic materials.

2.03 ADMIXTURES

- A. Use only standard brands of admixtures for concrete, approved by the Architect, meeting or exceeding the following requirements.
 1. Air entraining admixtures shall conform to "Specifications for air-entraining admixtures for Concrete" ASTM C-260.

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2. Water Reducing Admixture: "Eucon WR-75" by The Euclid Chemical Co., "Pozzolith 200N" by Master Builders, "Plastocrete 161" by Sika Corporation, and WRDA-64 by W.R. Grace. The admixture shall conform to ASTM C-494, Type A and not contain more chloride ions than are present in municipal drinking water.
3. Water Reducing, Retarding Admixture: "Eucon Retarder-75" by The Euclid Chemical Co., "Pozzolith 100XR" by Master Builders, DARATARD-17 by W.R. Grace, or "Plastocrete 161MR" by Sika Corporation. The admixture shall conform to ASTM C-494, Type D and not contain more chloride ions than are present in municipal drinking water.
4. Mid-Range Water Reducing Admixture: "Daracem-55" as manufactured by W.R. Grace, "Sikament HP" as manufactured by Sika Corporation, or approved equal. The admixture shall not contain calcium chloride, and shall conform to ASTM C-494, Type A.
5. High Range Water Reducing/Retarding Admixture (Superplasticizer): "ECON 537" by The Euclid Chemical Co., DARACEM 100 by W.R. Grace, or "Sikament 320" by Sika Corporation. Admixture shall conform to ASTM C-494, Type G, and not contain more chloride ions than are present in municipal drinking water.
6. High Range Water Reducing Admixture (Superplasticizer): "Eucon 37" by The Euclid Chemical Co., WRDA-19 by W.R. Grace, or "Sikament 86" by Sika Corporation. The admixture shall conform to ASTM C-494, Type F, and not contain more chloride ions than are present in municipal drinking water.
7. Non-Corrosive, Non-Chloride Accelerator: "Accelguard 80" by The Euclid Chemical Co., DARASET by W.R. Grace, "Plastocrete 161FL" by Sika Corporation, or approved equal. The admixture shall conform to ASTM C-494, Type C or E, and not contain more chloride ions than are present in municipal drinking water.
8. Concrete Corrosion Inhibitor: DCI Corrosion Inhibitor by W.R. Grace & Co., "Armatec 2000" by Sika Corporation or approved equal. The admixture shall conform to ASTM C-494 Type C. When this is specifically noted to be used, it shall be used at a dosage rate of 2 gallons per cubic yard (Armatec 2000 by Sika Corporation at 1/2 gallon per cubic yard).
9. Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.05% ions by weight of cement are not permitted.
10. Certification: Written conformance to the above mentioned requirements and the chloride ion content of the admixture will be required from the admixture manufacturer prior to mix design review by the Architect.

2.04 ACCESSORY MATERIALS

- A. Expansion joint filler: Provide preformed strips, non-extruding and resilient bituminous type, of thickness indicated, complying with ASTM D1751, ("Fibre Expansion Joint" by W.R. Meadows or approved equal).
- B. Curing and Sealing Compound: (Meeting ASTM C-309) The compound shall be a clear styrene acrylate type, 30% solids content minimum, and have test data from an independent testing laboratory indicating a maximum loss of 0.030 grams per sq. cm. when applied at a coverage rate of 300 sq. ft. per gallon. Compound shall be "Super Rez Seal" by The Euclid Chemical Co., "Vulkem 2101" by Mameco International, Inc., "Masterkure 30" by Master

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Builders, or "Sealtight CS-309" by W.R. Meadows. Manufacturer's Certification required.
(Sodium Silicate Compounds are prohibited.)

- C. Dissipating Resin Curing Compound: (Meeting ASTM C-309) The compound shall be a dissipating resin type compound, "Kurez DR" by The Euclid Chemical Co., "Vulkem 2100" by Mameco International, "Sealtight 3100" by W.R. Meadows, or approved equal. The film must chemically break down in a two-to-four week period. (To be used where a dissipating curing compound is required.)
- D. Bonding Materials: The compound shall be a polyvinyl acetate, rewettable type, "Euco Weld" by The Euclid Chemical Company or "Weld-crete" by The Larsen Company. Use only in areas not subject to moisture.
- E. Bonding Admixture: The compound shall be a latex, non-wettable type, "SBR Latex" or "Flex-Con" by The Euclid Chemical Company, or "Daraweld C" by W.R. Grace.
- F. Structural Bonding Epoxy Adhesive: The compound shall meet ASTM C-881 and shall be a two (2) component, 100% solids, 100% reactive compound suitable for use on dry or damp surfaces, "Euco Epoxy #452 MV or #620" by The Euclid Chemical Company, "Sikadur Hi-Mood or Sikadur 32 Hi-Mod LPL" by Sika Chemical Corporation.
- G. Patching Mortar: "Verticoat" by The Euclid Chemical Co. or "Sika Repair 223" by Sika Chemical Corporation. The compound shall be epoxy type, 100% solids, suitable for use on dry or damp surfaces.
- H. Patching Compound: Free-flowing, polymer-modified cementitious repair mortar, "Euco Thin Top Supreme" by The Euclid Chemical Co., "SikaTop 121" or "SikaTop 122" by Sika Corporation.
- I. Epoxy Joint Filler: Shall be a multi component, 100% solids compound with a minimum shore D hardness of 50, "Euco Epoxy #700" by The Euclid Chemical Company or "Sikadur 51 NS/SL" by Sika Chemical Corporation. When and where this is specifically noted to be used, this shall be applied as late as possible after the concrete floor slab is poured, preferably at least 6 months, but not earlier than 2 months after the concrete floor slab is poured. **Use in all interior slab joint locations, where concrete slab is to be left exposed.**
- J. Non-shrink Grout: The grout shall conform to CRD C-621-83, "Corps of Engineers Specification for Non-shrink Grout". The grout shall be "Hi-Mod" (non-catalyzed metallic) or "Euco N-S" (non-metallic) by the Euclid Chemical Company, or "Embeco 636" (non-catalyzed metallic), "Masterflow 713" (non-metallic) by Master Builders, or "Sealtight 588 Grout", by W.R. Meadows.
- K. Abrasive Aggregate for Non-slip Aggregate Finish: "Non-Slip" by The Euclid Chemical Company, "Alundum" by North Company or approved equal.
- L. Evaporation Retarder: The compound shall be "SikaFilm" by Sika Corporation, "Confilm" by Master Builders, or "EucoBar" by Euclid Chemical Company.
- M. Joint Sealant: Shall be "Eucolastic I" by The Euclid Chemical Company, or "SikaFlex Ia" by Sika Corporation. The sealant shall be a one part urethane sealant requiring no primer and conforming to ASTM C-920, Type S, grade NS., class 25. **Use in all exterior slab joint locations.**

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- N. Concrete Fibers: Concrete fibers for all designated areas shall be 100% virgin polypropylene material. Fibers shall be 1/2" or 3/4" in length such as Grace "Microfiber" by W.R. Grace, "Fibermesh" by Fibermesh Co., or approved equal. Fibers shall be used at a minimum dosage rate of 1-1/2 lbs. per cubic yard, unless otherwise specified. Grace "Microfiber" shall be used at a rate of 1 lb. per cubic yard.
- O. V.O.C. Curing and Sealing Compounds: When curing and sealing compounds must meet V.O.C. regulations (or under such conditions where proper ventilation for safety is not possible), the curing and sealing compounds shall meet ASTM C-309 and shall be "Sealtight Vocomp 25" water-base acrylic cure and sealing compound by W.R. Meadows, or approved equal. Dissipating resin curing compounds shall be "Sealtight 1100" by W.R. Meadows, or approved equal. All curing and sealing compounds shall be coordinated with any floor coverings or toppings to insure that no conflict exists with the required adhesives.
- P. Chemical Floor Hardener: "Liqui-Hard Ultra" by W.R. Meadows, or approved equal.
- Q. Waterstops: "Sealtight PVC Waterstops" by W.R. Meadows, or approved equal. All waterstops shall comply with the Corps of Engineers CRD-C 572.

2.05 EQUIPMENT FOR MIXING & PLACING

A. CONVEYING EQUIPMENT

1. Use crane bucket, wheelbarrow, pumps, or buggies to deliver concrete to placing location.
2. Chuting permitted only by methods to insure a practically continuous flow of concrete at delivery and to prevent material separation.
3. If pumping is employed, secure prior approval of equipment, procedures and mix design. No aluminum pipes or chutes will be permitted for pumping, chuting or tremie operations.

B. COMPACTION EQUIPMENT

1. Use internal mechanical vibrators with 7000 rpm minimum frequency.

2.06 CONCRETE MIXES

- A. Provide a mix design prepared by the approved testing agency, based on strengths of the approved materials, and meeting the requirements stated on the Drawings.
- B. Proportions for concrete mixes shall be in accordance with ACI 301, Section 3.9. All mixes must be approved by the Architect prior to use on the job. No deviations from the approved mixes will be permitted without written prior approval of the Architect.
- C. Where the concrete production facility can establish the uniformity of its production for concrete of similar strength and materials based on recent test data, the average strength used as a basis for determining mix design proportions shall exceed the specified design strength by the requirements of ACI-318, Section 4.3 or ACI-301, Section 3.9.
- D. When a concrete production facility does not have field test records for calculation of standard deviation, the required average strength shall be at least 1200 psi greater than the specified design strength.

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- E. Secure the Architect's approval of each mix design, including new mix designs required to be prepared should there occur a change in materials being used.
- F. **All concrete shall contain the specified water-reducing or water-reducing retarding admixture and/or mid-range or high-range water-reducing admixture (superplasticizer). All concrete slabs, placed at air temperatures below 40° F shall contain the specified non-corrosive non-chloride accelerator. All concrete required to be air entrained shall contain an approved air-entraining admixture. All pumped concrete, concrete for industrial slabs, architectural concrete, concrete required to be watertight, and concrete with a water-cement ratio below 0.50 shall contain the specified high-range water-reducing admixture (superplasticizer). All concrete slabs and flatwork, both interior and exterior, shall contain the specified concrete fibers.**
- G. All concrete containing the high-range water-reducing admixture (superplasticizer) shall have a maximum slump of 8" unless otherwise approved by the Architect. The concrete shall arrive at the job site at a 3" max. slump, be verified, then the high-range water-reducing admixture added to increase the slump to the approved level. All other concrete shall have a maximum slump of 3" for slabs and 4" for other members. This maximum slump may not be exceeded except by the job-site addition of the specified high-range water-reducing admixture, (Superplasticizer). In those portions of the structures where member dimensions and/or congestion due to reinforcing steel prevent the proper placement and consolidation of the concrete at the maximum slump specified, superplasticizer shall be used by the Contractor in lieu of increasing the slump of non-superplasticized concrete by the addition of water.
- H. Hardrock concrete
 - 1. Achieve a weight of approximately 145 pcf and an ultimate compressive strength as listed in the following table.

Concrete Types	Req'd. 28 day Compressive Strength	Maximum Water Cement Ratio	Air Content
<u>Location</u>	<u>Strength</u>	<u>Cement Ratio</u>	<u>Content</u>
Concrete Footings	3000	0.50	1% - 3%
Interior Concrete Slabs	4000	0.45	3% - 5%
Exterior slabs	4000	0.45	5% - 7%

- I. Do not retemper mix by adding water in field.

TECHNICAL SPECIFICATIONS

PART 3 - EXECUTION

3.01 PREPARATION

A. SURFACE CONDITIONS

1. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

B. CLEANING FORMS

1. Before placing concrete, clean spaces within forms of all refuse, debris and dirt. Provide cleaning holes for removal of foreign matter; after cleaning, replace forms at openings and brace to prevent form failure.

C. MIXING & PLACING

1. Conform to the requirements of ACI 301, Chapters 7 and 8.
2. Clean free of all foreign matter and ice, all mixing and transporting equipment, subgrade and forms to receive concrete.
3. Clean reinforcement of deleterious coatings and ice.

D. EMBEDMENT FOR GENERAL WORK IN OTHER SECTIONS

1. Allow other trades time and facilities to install necessary embedded items such as nailers, hangers, inserts and sleeves; and other items as noted herein.

E. EMBEDMENT FOR MECHANICAL & ELECTRICAL WORK

1. Cooperate with and allow time for and access to forms for embedment of pipes and conduits below slabs. All pipes and conduits shall be placed below the full required thickness of the slabs-on-grade.
2. Place sleeves and core forms as required for mechanical and electrical work, sizes and locations as shown as directed by cognizant trades.

3.02 INSTALLATION OF FORMWORK

- A. In accordance with Section 03100.

3.03 CONCRETE MIXING

- A. Concrete for minor work, when approved by the Architect, may be mixed at the site in a power mixer when the mixer has a capacity not less than one full sack batch.
- B. Unless otherwise approved by the Architect, use ready mixed concrete complying with ASTM C94.

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1. Mixing

- a. Mix each batch of concrete not less than 15 minutes, five minutes of which shall be at the site.
- b. Rotate the drum at the rate specified by the manufacturer of the mixer as "mixing speed."
- c. Whenever there is a delay in unloading, rotate the drum slowly at intervals to prevent incipient set of concrete.

2. Addition of water:

- a. Normally, do not deliver concrete with total permissible amount of water incorporated therein.
- b. After water is added, at least five minutes of mixing time shall be immediately prior to discharge.
- c. Concrete will be rejected if not placed in final position within 1-1/2 hours after water is first added to the batch.

3. Concrete at time of placing shall be in such condition that it can be placed properly.

4. Discharge all wash water from the mixing drum before the truck reloads at the batching plant.

5. Mixing equipment shall not be charged beyond its rated capacity.

C. Concrete consistency

1. Use the amount of water established by the approved mix design.

- a. Do not exceed the maximum quantity specified for the grade of concrete.
- b. Use the minimum amount of water necessary to produce concrete of the workability required by the Architect.
- c. Do not supplement the predetermined amount of water with additional water for any reason.

2. Measure concrete consistency by ASTM C143 method.

3. Provide maximum slumps of concrete as follows:

- a. Footings and slabs on soil: 3", (+1", -1").
- b. Other concrete: 4".

D. Cement grout and dry-pack grout

1. Mix at the site, in composition of one volume of portland cement to 2-1/2 volumes of fine aggregate.

2. Mix the materials dry; then add sufficient water to make the mixture flow under its own weight.

3. When grout is used as dry-pack concrete, add sufficient water to make a stiff mixture which can be molded into a sphere.

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E. Miscellaneous provisions

1. Provide strengths of concrete as shown on the Drawings and the table herein.
2. Provide concrete dense and free from honeycomb and other defects.
3. Place and finish members to conform to the shapes and dimensions indicated, with all surfaces true to line, plumb, and level.

3.04 INSERTS, ANCHORS, AND EMBEDDED ITEMS

A. Concrete fasteners

1. In addition to their use where the pins are loaded in shear, powder driven concrete fasteners may be used in tension for support of light loads such as acoustical ceilings, duct work, conduits, pipes, and similar items when such loads are limited to less than 75 lbs.
2. Where "Red Head", "Hilti", or similar types of concrete anchor bolts are used for significant gravity loads or seismic anchorage, test in the presence of the approved testing agency:
 - a. Proof test 50% of the bolts (alternate bolts in any group arrangement) to twice the allowable load.
 - b. If there are any failures, also test the immediately adjacent bolt.
3. Where hanger rods, bolts, wire, or similar items are used to suspend construction items, place in the concrete as required and/or indicated.

B. Reglets, Reveals, and Rebates

1. Form reglets, reveals and rebates as required to receive frames, flashing, and other equipment, and as shown on the Drawings.
2. Verify the dimensions and positions of required reglets, reveals, and rebates with the Architect and with trades whose work is related to or contingent upon such dimensions and positions.

C. Embedded Piping, and Rough Hardware

1. Coordinate the various trades who are required to fasten work to the structure, or are required to insert therein any sleeve, box, bolt, anchor, insert, or other rough hardware.
2. Provide every facility for setting all required items accurately in the forms.
3. Be responsible for changes in position of such items after they have been set.
4. Provide in the forms for all sleeves, boxes, bolts, anchors, inserts, strap anchors, for frames, and other rough hardware required for the Work, and which are shown or required to be embedded in the concrete.
5. Conduits and sleeves

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- a. Locate so as not to reduce the strength of construction. Do not place pipes and conduits within the required thickness of the slabs.
- b. In placing conduits at slabs on earth, place below the botto of slab.

3.05 CONVEYING AND PLACING CONCRETE

A. Before placing concrete, thoroughly clean forms, wash out with water, and make tight.

B. Time of placing

1. Do not place concrete until reinforcement, conduits, outlet boxes, anchors, sleeves, hangers, bolts, and other embedded materials are securely and properly fastened in their correct positions.
2. Secure the Architect's approval of reinforcement before commencing placement of concrete.

C. Preparation

1. Before new concrete is deposited upon or against concrete that has taken its initial set or has hardened, remove all incrustations from forms and reinforcement.
2. Remove all laitance, oil, and loose particles from concrete and concrete surfaces, and thoroughly clean the forms with water under stiff pressure.
3. Remove all laitance after concrete has hardened partially (not less than two hours nor more than four hours after placing) by brushing with stiff bristles, or by directing a stream of water from a 1/4" nozzle, or by other methods approved by the Architect, to expose the clean top surface of the coarse aggregate.
4. Where cleaning is not satisfactory to the Architect, sandblast the surface and then wash again.

D. Method of placing

1. Place concrete only under the degree of inspection described elsewhere in these Specifications, and as required by governmental agencies having jurisdiction.
2. Do not place concrete outside of regular working hours unless required inspection authorities have been notified properly and are present.
3. Spouts, pipes, troughs, belts, chain buckets, and other equipment may be used in conveying concrete, but the manner and method used shall be only as approved by the Architect.
4. Do not permit concrete to free drop more than 4'-0".
5. Deposit concrete direct into conveyances, and direct from conveyances to final points of repose, except where troughs, buckets, or the like are used, in which case dump concrete into hoppers and then into the conveyances.

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6. Where tremies are used, or where the free drop is 4'-0" or more, and through reinforcement, use a dumping box or board, moving the concrete from there by shovels or hoes.
7. Deposit concrete so that the surface is kept level throughout, a minimum being permitted to flow from one position to another, and place as rapidly as practicable after mixing.
8. Do not use in this Work any concrete not placed within 30 minutes after leaving the mixer.

E. Tamping and conveying

1. Thoroughly work concrete around reinforcement and embedded fixtures, and into corners of forms, during placing operations.
2. Completely compact and vibrate all concrete including floor slabs with tamping poles, mechanical vibrators and by tapping forms until the concrete is thoroughly compact and without voids. Determine the number of tampers and vibrators needed by the amount and method of placing concrete.
3. Exercise care to tamp and vibrate concrete vigorously and thoroughly to obtain maximum density.
4. Use manual tampers as well as mechanical vibrators.
5. Exercise care to direct the quick handling of vibrators from one position to another.
6. Do not over-vibrate concrete.
7. Do not move concrete by use of vibrator.
8. Have at least one spare vibrator on site during all concrete pours.

F. Stoppages

1. Stop concrete placing only when and where approved by the Architect.
2. Maintain flow surfaces of freshly placed concrete as level whenever a pour is stopped, providing tight dams to accomplish this.
3. Make horizontal construction joints only where shown on the Drawings or specifically approved by the Architect.
4. Provide keys and dowels at construction joints where indicated on the Drawings, and where concrete placement is interrupted.

3.06 STEPS, SLABS, WALK, AND PAVING ON EARTH

A. Preparation for slabs on earth

1. Prepare the subgrade and base as specified in other Sections.
2. Dampen the subgrade for exterior slabs and paving if necessary prior to placing concrete.

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B. Placing and finishing

1. Mechanically vibrate and then tamp the freshly placed concrete, using a heavy tamper, or similar means, until at least 3/8" of mortar is brought to the surface.
2. Use tampers having a face consisting essentially of a grid of parallel metal bars.
3. Tamp with a light tamper, and screed with heavy straightedge, until depressions and irregularities are worked out and the surfaces are true to finish grades and elevations.
4. Remove excess water and debris worked to the surface in compaction and screeding.
5. Remove laitance as described previously.
6. When concrete has hardened sufficiently, float to a compact and smooth surface.

C. In Slabs-On-Grade Provide

1. Contraction (control) joints in interior work.
 - a. By use of tooled control joints or at Contractor's option by sawcutting to 1/4 slab depth.
 - b. Where not otherwise shown on Drawings, provide control joints at column centerlines and/or at the following maximum spacing:
 - 4" slab max. spacing = 10 ft. each way.
 - 5" slab max. spacing = 10 ft. each way.
 - 6" slab max. spacing = 12 ft. each way.
 - 7" slab max. spacing = 14 ft. each way.
 - 8" slab max. spacing = 14 ft. each way.
 - c. Provide close coordination with the Architectural joint layout, pattern and spacing for all exposed to view floor slabs. This layout shall be verified prior to pouring concrete.
2. Joints in Exterior Work
 - a. Provide contraction joints in exterior work where shown by means of 1" deep tooled joints with edges rounded and tool marks removed. If the layout of the contraction joints is not shown on the plans, then the Contractor shall submit a proposed layout to the Architect for approval with joints at a maximum of 5'-0" o.c.
3. At all construction joints of slabs on grade, discontinue slab reinforcement, and provide smooth, greased dowels.
4. Provide isolation joints where shown at contacts between slabs and vertical surfaces. Form with 15# felt paper for interior work and expansion joint filler for exterior work.
5. Seal exterior expansion and contraction joints with the here-in specified joint sealing compound.
6. Provide the finish surfaces shown on the Drawings or otherwise directed by the Architect, in accordance with pertinent provisions of Section 03345 of these Specifications.

- D. Cure and protect concrete in accordance with pertinent provisions of Section 03345 of these Specifications, and ACI 302.

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3.07 SODA AND ACID WASH

- A. At concrete surfaces to receive plaster, paint, or other finish, and which have been formed by oil-coated forms, scrub with a solution of 1-1/2 lbs caustic soda to one gal. of water.
- B. On surfaces where smooth wood or waste molds have been used, scrub with a solution of 20% muriatic acid or hydro-chloric acid.
- C. After the surfaces have been scrubbed, wash with clean water as soon as possible.

3.08 DEFECTIVE CONCRETE

- A. The following concrete will be deemed to be defective, and shall be removed promptly from the job site.
 - 1. Concrete which is not formed as indicated, is not true to intended alignment, is not plumb or level where so intended, is not true to intended grades and levels.
 - 2. Has voids or honeycombs that have been cut, resurfaced, or filled, unless with the approval of the Architect.
 - 3. Has sawdust, shavings, wood, or embedded debris.
 - 4. Does not have the specified finish, or reveals.
 - 5. Has cracking which is more than minor hairline cracks, and which are unacceptable to the Architect.
 - 6. Has slab joints which have experienced slab curling to an extent which is unacceptable to the Architect.
 - 7. Or does not conform fully to the provisions of the Contract Documents.
- B. Repairs and Replacements
 - 1. Defective concrete may be cut out and repaired with gunite, or other approved methods, when and as directed by the Architect.
 - 2. Where defective concrete is found after removal of the forms, cut out the defective concrete, if necessary, and make the surfaces match adjacent surfaces.
 - 3. Repair of Surface Defects. All voids, damaged places, fins, projections, honeycomb areas, and tierod holes shall be removed down to sound concrete and shall be repaired immediately after form removal and after a concrete curing compound is applied. The specified bonding agent shall be used for all patching and the specified epoxy adhesive and/or epoxy mortar shall be used for all structural repairs. All patching and repairs shall have prior approval of the Architect as to method and procedure. Any concrete which has not been formed as shown on the contract drawings, is out of alignment or level or indicated a defective surface or unsoundness of any nature shall be removed and replaced to the limits required by the Architect unless he grants permission to patch or otherwise correct the defective work. Permission to patch or attempt the correction shall not be construed to be a waive of the Architect's right to require complete removal of defective work.

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4. Work uneven surfaces and angles of concrete to a surface matching adjacent concrete surfaces.

3.09 GROUTING AND CEMENT POINTING

- A. All column base plates, equipment bases, and other locations noted on the structural drawings shall be grouted with the specified non-shrink grout. All exposed grout shall be the specified non-metallic type.

3.10 MISCELLANEOUS CONCRETE ITEMS

- A. Walls and curbs
 1. Construct header walls and curbs as shown on the Drawings.
 2. Trowel exposed concrete surfaces smooth.
- B. Leave openings in the floor slabs and future foundations for machines and equipment, where so indicated on the Drawings, and in dimensions and arrangements required for the approved machines and equipment.

3.11 INSPECTIONS & TESTING

- A. The required testing services of Section 16.3 and 16.4 of ACI-301 shall be performed by an independent testing laboratory approved by the Architect and paid for by the Owner. The testing services required in Section 16.5 shall be performed by the same testing laboratory and paid for by the General Contractor.
- B. The testing laboratory representative shall be present during the placement of all concrete unless this requirement is waived by the Architect. The testing laboratory shall conduct the tests specified in 16.3 and in addition shall inspect the reinforcing steel placement (including grade of steel) prior to the beginning of placement. The Contractor shall provide ample notice to the testing laboratory and shall make available to the testing laboratory, shop drawings of the reinforcing steel placement bearing the shop drawing review stamp of the Architect.
- C. When requested the testing agency shall provide evidence of recent inspection (within the last three years) of its facilities by the Cement and Concrete Reference Laboratory of the National Bureau of Standards. Evidence shall be presented to indicate that deficiencies mentioned in the report of that inspection have been corrected.
- D. Standard slump and cylinder samples (3) must be taken after addition of water. The method of measuring water and the person(s) authorized to add water and make samples must be mutually responsible for cost of additional sampling and testing costs related to discharging concrete in conflict with Contract Documents. All concrete requiring a slump change of more than 2", except when the HRWR admixture is being used, will be rejected.
- E. Compression test specimen: ASTM C 31-80, one set of 3 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cure test specimens are required. Test one cylinder at seven days, one at 28 days, and hold the third cylinder until needed.

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- F. Slump and compressive strength tests: ASTM C 39-81 - one set for each 50 cu. yd. or fraction thereof, of each class of concrete placed in any one day or for each 5000 sq. ft. of surface area placed: one specimen tested at 7 days, one specimen tested at 28 days and one specimen retained in reserve at the laboratory for later testing if required.
- G. Determine air content of normal-weight concrete for each strength test. In addition, for all exterior flat-work concrete, determine air content per ASTM C 231-82 for each 20 cu. yd. placed.
- H. When concrete fails to meet the acceptance criteria specified in ACI-301, Section 17.2, the Architect may order further testing of concrete in place in accordance with Section 17.3. When such tests are ordered, cost of testing shall be paid by the Contractor.
- I. The Contractor shall bear all cost of correcting rejected work, including the cost of the Architect's additional services thereby made necessary.

END OF SECTION 03300

TECHNICAL SPECIFICATIONS

SECTION 03345 CONCRETE FINISHING

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Work included: Drawings and general provisions of the Contract Documents including General, Supplementary and other Conditions and Division 1, "General Requirements" Sections, apply to the work specified in this Section.
- B. Related work:
 - 1. Section 03300: Cast-in-place concrete.

1.02 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Except as may be modified herein or otherwise directed by the Architect, comply with ACI 301, "Specifications for Structural Concrete for Buildings."
- C. Preinstallation (or Preconstruction) Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination".
- D. STANDARD SPECIFICATIONS
 - 1. Refer to Section 03300 for same and conform thereto as they apply to concrete curing and finishing work of this Section.

E. DEFECTIVE WORK

- 1. Contractor shall remove and replace at his own expense all defective work as adjudged by the Architect.

1.03 SUBMITTALS

- A. Submit:
 - 1. Submit manufacturer's product data and installation instructions for proprietary materials including curing agents, sealers, hardeners, and the like.

1.04 JOB CONDITIONS

- A. Refer to Section 03300 for same and conform thereto as they apply to concrete curing and finishing work of this Section.

TECHNICAL SPECIFICATIONS

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Concrete materials: Comply with pertinent provisions of Section 03300, except as may be modified herein.
- B. Curing Compound for Curing Exterior Slabs:
 - 1. Furnish liquid membrane-forming curing compound conforming to ASTM C309, Type I clear. Compound shall be a clear styrene acrylate type, 30% solids content minimum, and have test data from an independent testing laboratory indicating a maximum loss of 0.030 grams per sq. cm. when applied at a coverage rate of 300 sq. ft. per gallon.
 - 2. Compound shall be “Super Rez Seal” by The Euclid Chemical Co., “Vulkem 2101” by Mameco International, Inc., “Masterkure 30” by Master Builders, “Sealtight CS-309” by W. R. Meadows, or approved equivalent.
 - 3. Manufacturer’s Certification required. (Sodium Silicate Compounds are prohibited.)
- C. Curing Compounds & Protection Paper for Curing Interior Slabs
 - 1. For Recessed Slab Surfaces to Receive Tile Setting Bed: Furnish 6 mil clear visqueen or reinforced waterproof kraft paper conforming to ASTM C171, Type I; liquid membrane-forming curing compound shall not be used for curing interior recessed slabs.
 - 2. For Slabs to Receive Floor Coverings: Furnish clear liquid curing compound, compatible with respective floor covering adhesives; W. R. Meadows “SealTight Med-Cure” concrete curing compound, or equivalent, as approved. Curing compound shall be fully compatible with all resilient flooring and carpet adhesives which will be used on the Project and guaranteed by the manufacturer, in writing, not to impair bonding adhesive.
 - 3. For Interior Slabs to be Left Exposed and Sealed: Furnish liquid membrane-forming acrylic polymer, water-based curing and sealing compound conforming to ASTM C309, Type I, Class B clear, non-yellowing; W. R. Meadows “VOCOMP-30” or equivalent, compatible with sealer specified below.
- D. Sealer
 - 1. For interior slabs to receive “SC” sealed finish furnish acrylic polymer, water-based sealer conforming to ASTM C309, Type I, Class B clear, non-yellowing; W. R. Meadows “VOCOMP-30”, or approved equivalent.
- E. Chemical Floor Hardener: Furnish “Liqui-Hard Ultra” by W. R. Meadows, or approved equal.

TECHNICAL SPECIFICATIONS

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 FINISHING OF FORMED SURFACES – REPAIR OF SURFACE DEFECTS

A. General:

1. After removal of forms, give the concrete surfaces one or more of the finishes specified below where so indicated on the Drawings, or directed by the Architect.
2. Immediately after form removal, patch all tie holes and repairable defective areas.
3. Revise the finishes as needed to secure the approval of the Architect.

B. Formed Surfaces to be Concealed in the Finished Work:

1. Leave surfaces with the texture imparted by forms, except patch tie holes and defects.
2. Remove fins exceeding 1/4" in height.

C. Formed Surfaces to be Left Exposed in the Finished Work: All exposed concrete not otherwise specified and excluding wall surfaces in mechanical rooms and the like, shall be treated as follows:

1. Fin Removal:

- a. Completely remove all surface fins by hand or power grinding with carborundum stone or power grinder to approved smoothness on surfaces to be left exposed.

2. Voids, Gravel Pockets and Similar:

- a. Cut out defective areas 1" deep; vertical edges.
- b. Wet cavities and adjacent area.
- c. Cement mortar to match adjacent areas, use as little water as possible.
- d. Retemper after 1 to 2 hours for shrinkage, as required.
- e. Thoroughly fill voids and finish off, match adjacent surface in exposed work.
- f. Finish with "Sacked Finish" as specified below.
- g. Keep patched and finished areas damp for 7 days.

3. Tie Holes:

- a. Clean and thoroughly dampen; fill solid with patching mortar as specified above for voids and pockets.

D. Sacked Finish

1. General:

TECHNICAL SPECIFICATIONS

- a. Provide sacked finish as specified below on all exposed surfaces of building walls and other dominant exposed surfaces.

2. Sacked Finish:

- a. Pre-dampen concrete while still green and apply matching color slurry of patching material specified above for minor defective areas and apply with burlap or sponge float.
- b. Remove any surplus, then rub with clean burlap; cure in approved manner.
- c. All sacked finish surfaces shall be smooth and uniform in appearance, pinhole free, with all imperfections completely concealed.

E. Wall & Curb Tops, Horizontal Offsets, Other Unformed Surfaces

1. In general, strike smooth after placing concrete, float to continued uniform surface and to texture reasonably consistent with adjacent formed surfaces, as approved.

3.03 FINISHING SLABS

A. Finishing Slabs – General

1. All floor surfaces shall be within $\pm 1/2"$ of finished floor elevations designated on plans. If variations greater than this exist, the Architect may direct the Contractor to grind the surfaces to bring them within the requirements. Patching of low spots shall not be permitted. Grinding shall be done as soon as possible, preferably within 3 days, but not until the concrete is sufficiently strong to prevent dislodging coarse aggregate particles.
2. Floor Flatness/Leveling Tolerances: F_F defines the maximum floor curvature allowed over 24 in. computed on the basis of successive 12 in. (300 mm) elevation differentials, F_F is commonly referred to as the "Flatness F-Number".

$$F_F = \frac{\text{Maximum difference in elevation, in decimals of inches, between successive 12" elevation differences.}}{4.57}$$

F_L defines the relative conformity of the floor surface to a horizontal plane as measured over a 10 ft. (3.5 m) distance. F_L is commonly referred to as the "levelness F-Number".

$$F_L = \frac{\text{Maximum difference in elevation, in decimals in inches, between two points separated by 10 ft.}}{12.5}$$

All floors shall be measured in accordance with ASTM E-1155 "Standard Test Method for Determining Floor Flatness and Levelness Using the "F-Number" System (Inch-Pound Units).

All float finishes shall achieve an $F_F 20/F_L 17$ tolerance.

Unless otherwise noted, all troweled slabs shall achieve an $F_F 35$ (Differences in elevation in successive 12 in. measurements shall not exceed 0.131 in.) / $F_L 33$ (Differences in elevation between two points shall not exceed 0.375" in 10 ft.).

TECHNICAL SPECIFICATIONS

3. Slab Curling: Acknowledging that there will be a strong possibility of having at least some slab curling at slab edges, the Contractor shall take reasonable means to keep this curling to a minimum. In the event that curling occurs to an extent and at locations which will be detrimental to the service and Architectural qualities needed for the final slab finish, the Contractor shall, at his expense, provide edge grinding or other means as necessary to bring the slab surface to a finish surface acceptable to the Architect.

B. Slab Finishes

1. Unless otherwise shown, scheduled or specified hereinafter, use the following finishes, as applicable:
 - a. Furnish smooth troweled finish for all floors to receive resilient floor coverings and carpeting.
 - b. Furnish smooth troweled finish for all interior floors to remain as walking surfaces.
 - c. Furnish smooth troweled finish for all exterior equipment pads, dumpster pads, and the like.
 - d. Furnish broomed float finish for interior recessed slabs to receive ceramic floor tile finishes and associated setting beds.
 - e. Furnish broomed trowel finish for all exterior walks, ramps, stairs and miscellaneous slab surfaces not otherwise specified to receive smooth trowel finishes.
 - f. Furnish "tactile" diamond pattern finish, in addition to broom finish, at handicap ramp curb-cut slab areas indicated to receive "tactile warning surface".
 - g. Furnish "non-slip" finish for cast-in-place curbs and associated gutters, as applicable, integral with sidewalks.
2. Before finishing work begins, place, strike off, consolidate and level and/or slope, as applicable, concrete to condition ready for finishing.
3. Consolidate placed concrete preferably with power driven floats of impact type except for thin joist slabs; use wood or cork-faced hand floats for surfaces inaccessible to power floats.
4. At slab-on-grade floor areas scheduled to receive tile flooring and associated mortar setting bed, recess slabs 2"; slope recessed slabs in these areas to allow for uniform thickness of tile setting bed material.
5. Replace slabs with excessive shrinkage cracks and those not properly sloped and finished to floor flatness and leveling tolerances specified above, as approved, without additional cost to Owner.

C. Float Finish:

1. After the concrete has been placed, consolidated, struck off, and leveled, do not work the concrete further until ready for floating.
2. Begin floating when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation.
3. During or after the first floating, check the planeness of the surface with a ten foot straightedge applied at not less than two different angles.

TECHNICAL SPECIFICATIONS

4. Cut down high spots and fill low spots.
 5. Refloat the slab immediately to a uniform sandy texture.
- D. Broomed Float Finish:
1. Provide a floated finish as described above. After floating, draw a broom across surface to a light scored texture finish, as approved.
- E. Troweled Finish:
1. Provide a floated finish as described above, followed by a power troweling and then a hand troweling.
 - a. Produce an initial surface which is relatively free from defects, but which still may show some trowel marks.
 - b. Provide hand troweling when a ringing sound is produced as the trowel is moved over the surface.
 - c. Thoroughly consolidate the surface by hand troweling.
 2. Provide a finished surface essentially free from trowel marks, uniform in texture and appearance, as directed and approved by the Owner.
 3. On surfaces intended to support floor coverings, use grinding or other means as necessary and remove all defects of such magnitude as would show through the floor covering.
- F. Broomed Trowel Finish:
1. Power float to trueness within the specified tolerance, and provide one-pass steel troweling. After troweling, draw a broom across surface to a light transverse scored texture, as directed and approved by the Owner.
- G. "Tactile" Finish:
1. After floating and applying broom finish, imprint surface of handicap curb cuts with a diamond pattern texture using an expanded metal grate imprinting tool, as approved.
- H. Non-Slip Finish:
1. After troweling, obtain finish by dragging a strip of clean, wet burlap across the slab and curb surfaces to produce a fine, granular, or sandy textured surface without disfiguring marks.
 2. Round edges and joints in curbs with an edger having a radius of $\frac{1}{4}$ ".
- I. Exterior Control Joint & Slab Edge Treatment:
1. Steel tool all control joints, all exposed perimeter edges, and edges of expansion joints, prior to filling with sealant, to a smooth bullnose form, using an edger having a radius of $\frac{1}{4}$ ", as approved.

TECHNICAL SPECIFICATIONS

2. Form control joints in uniform straight lines, spaced no greater than 5 feet apart, U.N.O. Coordinate exact locations and alignment with Architect.

3.04 CURING AND PROTECTION

- A. The Contractor shall use all necessary precautions to keep cracking of all concrete work to an absolute minimum. Beginning immediately after placement, protect concrete from premature drying, excessively hot and cold temperatures, and mechanical injury.
 1. Maintain curing procedures used for seven (7) days at minimum temperature of 50° F; if mean daily temperature drops below 40° F during this period, extend curing period an equal number of days or provide temporary heat or additional protection to maintain specified minimum temperature of air in contact with concrete.
- B. Temperature, wind, and humidity;
 1. When concrete slab placements are subjected to high temperatures, wind and/or low humidity the Architect may require the use of the specified evaporation retarder to minimize plastic cracking. The compound may be required to be applied one or more times during the finishing operation. The initial application is usually made after the strike-off operation.
 2. Cold weather:
 - a. When the mean daily temperature outdoors is less than 40° F, maintain the temperature of the concrete between 50° F and 70° F for the required curing period.
 - b. When necessary, provide a proper and adequate heating system capable of maintaining the required heat without injury due to concentration of heat.
 - c. Do not use combustion heaters during the first 24 hours unless precautions are taken to prevent exposure of the concrete to exhaust gases which contain carbon dioxide.
 - d. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - e. Only the specified non-corrosive non-chloride accelerator shall be used. Calcium chloride, thiocyanates or admixtures containing more than 0.05% chloride ions are not permitted.
 3. Hot weather:
 - a. When necessary, provide wind breaks, fog spraying, shading, sprinkling, ponding, or wet covering with a light colored material, applying as quickly as concrete hardening and finishing operations will allow.
 3. Rate of temperature change:
 - a. Keep the temperature of the air immediately adjacent to the concrete during and immediately following the curing period as uniform as possible and not exceeding a change of 5° F in any one hour period, or 50° F in any 24 hour period.

TECHNICAL SPECIFICATIONS

C. Curing Walls & Formed Surfaces:

1. Where forms are exposed to the sun, minimize moisture loss by keeping the forms wet until they can be removed safely.
2. In hot weather, immediately after forms have been removed, cure by continuous sprinkling or covering with absorptive mat or fabric kept continuously wet or use vapor mist bath.
3. In freezing weather, protect in accordance with ACI 301.

D. Curing Exterior Slabs:

1. Spray slabs with liquid membrane-forming compound specified above for exterior slabs, applied at not less than the manufacturer's specified and recommended rate.

E. Curing Interior Slabs:

1. For Recessed Slab Surfaces: Install appropriate sheeting as specified above, installed over slabs immediately upon completion of surface finish work as work proceeds. Lap 3 inches and tape or otherwise seal edges and hold down by adequate means to prevent dislodgment. Maintain covering for a minimum of seven (7) days. Repair any damage to membrane which allows escape of slab moisture. Maintain membrane upkeep until full removal.
2. For Slabs to Receive Resilient and Carpet Floor Coverings:
 - a. Spray new slab surfaces with liquid curing compound specified above, applied at not less than the manufacturer's specified and recommended rate and in accordance with manufacturer's written instructions.
 - b. In addition, all floor slabs shall be covered with blankets for a minimum of 72 hours after pouring.
3. For Slabs to be Left Exposed and Sealed:
 - a. Spray new slab surfaces with liquid membrane-forming curing and sealing compound specified above, applied at not less than the manufacturer's specified and recommended rate and in accordance with manufacturer's written instructions.
 - b. In addition, all floor slabs shall be covered with blankets for a minimum of 72 hours after pouring.
 - c. After curing compound has fully dried per manufacturer's recommendations, Contractor shall cover such slab surfaces with protective sheeting as necessary to avoid damage due to subsequent construction work and prior to final finishing of such floor surfaces as specified below.

F. Protection from mechanical injury:

1. During the curing period, protect all concrete during period from damaging mechanical disturbances, more especially load stresses, heavy shock, and excessive vibration.
2. Protect finished concrete surfaces from damage from construction equipment, materials and methods, from application of curing procedures, and from rain and running water.

TECHNICAL SPECIFICATIONS

3. Do not load self-supporting structures in such a way as to overstress the concrete.

3.05 APPLIED FINISHES

A. Sealed Finish: Where sealed finish is scheduled

1. Apply one coat acrylic polymer, water-based sealer conforming to ASTM C309, Type I, Class B clear, non-yellowing; W. R. Meadows "VOCOMP-30", or approved.
2. Apply sealer strictly in accordance with the sealer manufacturer's written application instructions and recommendations, for a uniform, low gloss sheen finish.
3. Apply the specified chemical floor hardener to all interior floor slabs scheduled to be left exposed.

END OF SECTION 03345

TECHNICAL SPECIFICATIONS

SECTION 05100 STRUCTURAL STEEL

PART 1 - GENERAL

1.01 DESCRIPTION

A. General Requirements

1. Drawings and general provisions of the Contract Documents including General, Special and other Conditions and Division 1, "General Requirements" Section, apply to the work specified in this Section.

B. General Description of Work

1. In general, work under this Section includes providing structural steel as shown on the Drawings, specified herein, and needed for a complete and proper installation in each case.

C. Related Work in Other Sections

1. Section 05500: Metal Fabrications.

1.02 QUALITY ASSURANCE

A. STANDARD SPECIFICATIONS & CODE OF PRACTICE

1. Standard Specifications:

- a. "Steel Construction Manual", current edition, as issued by the American Institute of Steel Construction (AISC); hereinafter called "Standard No. 1".
- b. Unless otherwise noted, furnish material conforming to the Standard No. 1 of types shown on the Structural Drawings.

2. Code of Practice:

- a. AISC "Code of Standard Practice for Steel Buildings and Bridges", current edition, hereinafter called "Standard No. 2".
- b. Unless otherwise noted, wherever the term "Owner" is used in Standard No. 2, it shall mean "General Contractor or other trades, all as specified in other Sections of these Specifications".

B. STANDARD SPECIFICATIONS FOR SURFACE PREPARATION FOR PRIMING

1. Steel Structures Painting Council (SSPC) "SSPC-SP1 Solvent Cleaning", hereinafter called "SP1"; "SSPC-SP3 Power Tool Cleaning", hereinafter called "SP3"; and "SSPC-SP6 Commercial Blast Cleaning", hereinafter called "SP6".

C. INSPECTIONS & TESTING

1. Cooperate with inspector; permit inspector's access to all places where work is being done.

TECHNICAL SPECIFICATIONS

2. Welding: Verify conformance with applicable Sections of Division 5. All welding shall be subject to special inspection.
3. Structural Steel Framing & Fabrications:
 - a. General: Tests will be performed as required by International Building Code, Chapter 17, as adopted by local jurisdiction and these specifications.
 - b. Shop Bolted Connections: Inspect in accordance with AISC specifications.
 - c. Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:
 - 1) Verify use of certified welders, and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 - 2) Perform visual inspection of all welds including fillet welds.
 - 3) Perform tests of complete penetration welds as required by technical specifications as follows. Inspection procedures listed are to be used at Testing Laboratory's option.
 - i. Radiographic Inspection: ASTM E94 and ASTM E142; minimum quality level "2-2T".
 - ii. Ultrasonic Inspection: ASTM E164.
 - iii. Magnetic Particle Testing: ASTM E1444.
 - d. Field Bolted Connections: Inspect in accordance with AISC specifications.
 - e. Field Welding: Inspect and test during erection of structural steel as follows:
 - 1) Verify use of certified welders, (AWS "Standard Qualification Procedure) and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies and submit copies of such reports to Contractor, Architect, Owner, Structural Engineer, and Local Building Department.
 - 2) Perform visual inspection of all welds including fillet welds.
 - 3) Perform tests of full penetration welds as required by technical specifications as follows:
 - i. Radiographic Inspection: ASTM E94 and ASTM E142; minimum quality level "Z-2T".
 - ii. Ultrasonic Inspection: ASTM E164.
 - iii. Magnetic Particle Testing: ASTM E1444.
 - f. Testing Program Summary: Testing agency special inspector shall submit a summary of the proposed testing program for review and approval; submit directly to Contractor, Architect, Owner, Structural Engineer, and Local Building Department.

D. QUALIFICATIONS

1. Fabricator/Erector: Shall have appropriate facilities and an adequate number of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section as indicated on Drawings. Shall have minimum of five (5) years of experience and be able, upon request, to show framing of size, materials, and scope similar to work of this Contract.
2. Welders: Shall be certified by the American Welding Society (AWS). Welders of structural steel shall have qualification as required by AWS D1.1. Each welder shall mark his identification symbol on his work.

E. CONNECTION IDENTIFICATION

1. Each person installing connections shall be assigned an identifying symbol or mark, and all shop and field connections shall be so identified so that the Owner's independent testing agency can refer to the person making the connection.

TECHNICAL SPECIFICATIONS

1.03 SUBMITTALS

A. SHOP DRAWINGS

1. Furnish complete, checked shop drawings for approval. Also provide verification and certification that the steel supplied for this project was manufactured and fabricated so as to comply with "Buy America" requirements.
2. Include complete information for the fabrication and erection of the structure's components, including all required dimensions, details, necessary accessory items as described in the Standard No. 1. Show sizes, configurations, spacing and location of framing, connections, bridging, reinforcing, anchoring, cambers, holes in webs, and other pertinent data, and showing welded connections and the length thereof, using AWS standard welding symbols in accordance with AWS 2.4. Clearly designate all portions of members, connections, and welds which are required to be fabricated and handled per the requirements for architecturally exposed structural steel (AESS).
3. Provide framing plans showing locations and sizes of holes in beam webs for coordination with sprinkler piping layouts.
4. Provide setting drawings, templates, and directions for installing anchor bolts and other required anchors;
5. Include with each detail shown on the shop drawings a reference to the Architect's and Structural Engineer's drawings and details, where applicable.
6. Calculate, obtain, and show all additional dimensions required which are not otherwise specifically set forth on Drawings. Obtain and coordinate dimensions with all connected and adjacent work. Verify all applicable dimensions.
7. Include manufacturer's specifications and other data needed to prove compliance with specified requirements.
8. Piece mark notations shall be indicated on layout drawings.
9. Shop drawings shall not be reproductions of Contract Drawings.
10. Shop drawings are interpretations of and are supplemental to the design drawings and specifications. Their intent is to demonstrate to the Architect that this Contractor has understood the design concept, and to provide detailed information necessary for the fabrication, assembly, and installation of the products and materials specified. Neither the shop drawings nor comments placed on them by the Architect shall be construed as being change orders.

B. CERTIFICATIONS

1. Submit certification of materials with copies of mill reports for each heat and type of steel used.
2. Submit complete manufacturer's mill test reports for bolts, nuts and washers. Markings and chemistry shall also comply with specification. Certification numbers shall appear on product containers and correspond to certification numbers on mill test report to be accepted. Mill test report shall be supplied to both the purchaser and Owner's independent testing agency.

TECHNICAL SPECIFICATIONS

C. PLACEMENT PLANS

1. Submit placement plans and details as required for the satisfactory placing, connection, and anchorage of all structural members.

D. WELDING PROCEDURES

1. Submit detailed welding procedures in accordance to ASW D1.1. Submit to the Owner's independent testing agency the detailed description of welding procedures proposed for use on structural metals. Obtain approval prior to any welding operation. Furnish joint welding procedure qualification tests, as required by AWS D1.1.

1.04 PRODUCT DELIVERY, STORAGE & HANDLING

A. Stacking & Shopping

1. Handle and stack all materials carefully to prevent deformation or damage. Store all structural steel members carefully on substantial timbers and blocking, so arranged that the steel will be properly drained. Special care shall be taken to avoid any twisting, deformation, or damage to the members.
2. Deliver materials to the job site properly marked to identify the location for which they are intended.
3. Use markings corresponding to markings shown on the reviewed Shop Drawings.
4. Keep primed steel members from touching each other by using wooden separators for stacking. Take measures to avoid damaging prime coat while stacking, loading or unloading and use wooden protectors to prevent damage from chain or cable cinches.

PART 2 - PRODUCTS

2.01 MATERIALS: All materials for this project shall comply with "Buy America" requirements.

A. Structural Steel

1. Provide carbon steel shapes, plates, and bars of structural quality, sizes, and types noted on Drawings and specified herein, for use in welded and bolted construction. Steel manufactured by the Acid Bessemer process shall not be used for structural purposes. Steel which, in the opinion of the Owner's independent testing agency, is badly corroded or physically damaged shall not be incorporated in the work.
 - a. Shapes, Threaded Rods and Plates: All 'W' and 'H' shapes shall conform to ASTM A992, Grade 50. All other pieces ASTM A36, Grade 36, unless otherwise noted on Structural Drawings.
 - b. Steel Tubing: ASTM A500 Grade B, $F_y = 46$ ksi unless otherwise noted on Drawings.
 - c. Steel Pipe: Unless otherwise shown on Drawings, or called for in the Specifications, ASTM A53, Type E or S, Grade B, $F_y = 36$ ksi. All HSS guardrail vertical posts shall comply with ASTM A500 Grade B, $F_y = 42$ ksi.
 - d. Substitutions: Should substitutions be required due to non-availability of sections shown, obtain Architect's prior approval. No substitutions permitted with members lighter in weight than shown on Drawings.

TECHNICAL SPECIFICATIONS

B. Fasteners

1. Standard Fasteners: Low-carbon steel externally and internally threaded fasteners conforming to requirements of ASTM A307, Grade A except as otherwise noted on Structural Drawings. All bolts, nuts and washers exposed to the weather shall be hot-dipped galvanized.
 - a. Anchor Bolts: Non-headed type with heavy hexagonal nuts for all connections unless otherwise indicated. Include lock washers under nuts or self-locking nuts. Anchor bolts shall conform to ASTM F1554 Grade 36, unless noted otherwise.
 - b. Unfinished Threaded Fasteners: Provide either hexagonal or square heads and nuts; except use only hexagonal units for exposed connections.
2. High-Strength Fasteners: Quenched and tempered steel bolts and nuts conforming to requirements of ASTM A325, or as otherwise noted on Structural Drawings. Provide heavy hexagonal head bolts and nuts and hardened steel washers. Load indicator washers conforming to ASTM F959 or tension control bolts shall be used. All bolts, nuts and washers exposed to the weather shall be hot-dipped galvanized.
3. Drilled-in-Concrete Anchors: Shall be concrete anchors as manufactured by Hilti Corporation, Rawl, or Simpson equivalent or approved equal having ICC approval, of the type noted on Structural Drawings.

C. Steel Stud Anchors

1. All steel stud anchors welded to steel beams or embedded items for concrete connections shall be "SC" shear connectors as manufactured by Nelson Stud Welding Division, Gregory Industries, Inc., Delta Stud Weld, or approved equal. Install as indicated on Drawings, automatically end-welded in shop or field with equipment recommended by manufacturer of studs.

D. WELD ELECTRODES

1. For base metal conforming with ASTM A36, A53, A500 and A992 Gr50, use E70xx series electrodes in accordance with AWS A5.1 or AWS A5.5.

E. ZINC COATING

1. All structural steel where exposed to weather or otherwise noted, shall be galvanized by the "hot-dip" method in accordance with ASTM A123, of the following coating weights per square foot of actual surface:

Steel under 1/16"	:	1.1 oz. average, 1.8 oz. min.
Steel 1/16" to under 1/8"	:	1.5 oz. average, 1.8 oz. min.
Steel 1/8" to under 1/4"	:	2.0 oz. average, 1.8 oz. min.
Steel 1/4" and heavier	:	2.3 oz. average, 2.0 oz. min.

2. Galvanize bolts and similar threaded fasteners in accordance with ASTM A153, Class A, B, C and D, as applicable.
3. Steel pipe shall be galvanized in accordance with ASTM A53.
4. Furnish certificate from plating firm attesting to conformance with Specifications for steel plates and shapes.

TECHNICAL SPECIFICATIONS

F. SHOP PAINTING MATERIALS

1. Galvanized Items: Furnish zinc-rich primer for re-galvanizing welds in galvanized steel, complying with Steel Structures Painting Council (SSPC) Painting System Guide PS12.01.
2. Portions of items to be embedded in concrete, or at high-strength bolted or welded connections: No shop painting required or permitted.
3. All Other Non-Ferrous Metal Items: Furnish Tnemec Company, Inc. "FD88 Azeroon Primer", or approved, lead-free, high solids modified alkyd primer, meeting or exceeding performance requirements of Federal Specification TT-P-86G, Type I.

G. GROUT FOR BASE & BEARING PLATES

1. For general use furnish Euclid "Hi-Flow Grout" or Master Builders "Masterflow 928 Grout", or approved, "flowable" consistency, with a minimum compressive strength in 28 days of 7000 psi.

H. OTHER MATERIALS

1. Provide all incidental and accessory materials, tools, methods, and equipment required for fabrication and erection of structural steel framing as indicated on Drawings.

2.02 FABRICATION

A. GENERAL

1. Fabrication and assembly shall be performed in the shop to the greatest extent possible, all in accordance with the requirements of AISC specifications and in strict accordance with the details shown on the Contract Documents or as accepted on shop drawings. Assemble and weld built-up sections by methods which will produce true alignment of axis without warp.
2. Beams and girders shall be upward cambered where indicated on Drawings. For beams and girders without specified cambers, fabricate members so that after erection, any minor camber due to rolling or fabrication is upward.
3. Identify all steel at mill, showing grade and yield points.
4. Properly mark and match-mark materials for field assembly and for identification as to location for which intended.
5. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
6. Where finishing is required, complete the assembly, including welding of units, before start of finishing operations.

B. STRAIGHTENING MATERIAL

1. If rolled sections are not straight within the tolerances allowed by ASTM A6, straighten by methods not injuring the metal, as approved. Examine all straightened material prior to fabrication for signs of distress or other defects; no distressed or otherwise defective material will be accepted.

TECHNICAL SPECIFICATIONS

C. OPENINGS & HOLES

1. Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members, only as approved by the Structural Engineer as shown on the Drawings and the reviewed Shop Drawings.
2. Provide threaded nuts welded to framing, and other specialty items as shown, to receive other work.
3. Cut, drill, or punch holes perpendicular to metal surfaces.
4. Do not flame cut holes or enlarge holes by burning.
5. Drill holes in bearing plates.
6. All holes and openings not indicated on Structural Drawings shall be approved by Structural Engineer in writing.
7. No sharp bends or kinks will be allowed.
8. The Contractor shall include provisions in the bid for holes for sprinkler piping to be placed through each structural steel beam and girder in locations as directed by the Engineer, if required by the sprinkler piping layout.

D. CONNECTIONS

1. Provide bolts and washers of types and sizes required for completion of field erection. Form connections as detailed; make all shop connections by welding or bolting as approved on shop drawings.
2. High strength bolted construction:
 - a. Install high strength threaded fasteners in accordance with AISC "Specifications for Structural Joints Using ASTM A325 or A490 Bolts," using fully pre-tensioned bolts. Use tension control assemblies to ensure proper installation or use direct tension indicating (DTI) washers.
 - b. Use A325-N bolts unless noted otherwise on the Drawings.
3. Welded construction: Comply with AWS Code for procedures, appearance, and quality of welds, and methods used in correcting welded work.
4. Assemble and weld built-up sections by methods which will produce true alignment of axes without warp.
5. No combination of bolts and welds shall be used for stress transmission in the same faying face of any connection.

E. WELDING

1. Conform to Standards No. 1 and No. 2 as applicable. All welding shall be in accordance with the "Structural Welding Code", ANSI/AWS D1.1, and shall be performed certified welders.
2. Welding processes other than shielded metal arc, submerged arc, and flux cored arc may be used, provided procedure qualification tests in accordance with the AWS are made for the intended application of all such processes.

TECHNICAL SPECIFICATIONS

3. Built-up sections assembled by welding, when present, shall be free of warpage, and all faces shall have true alignment.
4. Welds not specified shall be continuous fillet welds, using not less than the minimum fillet as specified by AWS, except make all structural steel welds not less than 3/16 inch, unless noted otherwise. Note on shop drawings when assumption of weld is used for review of conformance.
5. Welding sequences, pre-post-heat methods, and detailing of joints shall be such as to reduce the residual stresses to a minimum.
6. The toughness and notch sensitivity of the steel shall be considered in the formation of all welding procedures to prevent brittle and premature fracture during fabrication and erection.
7. Prepare and clean sharp edges to be joined of all oil, grease, scale, and rust in accordance with AWS D1.1.
8. Remove all slab or flux remaining on any bead before proceeding. Remove any cracks or blow holes that appear on any bead by chipping, grinding, or arc-gouging before proceeding.
9. In galvanized steel work, touch-up surfaces damaged by welding with zinc-rich primer complying with SSPC-PS12.01.

F. FINISHING

1. Prepare compression joints depending upon contact bearing to common plane by milling, sawing or approved means.

G. STEEL STUD & DEFORMED BAR ANCHORS

1. All anchors shall be automatically end-welded in the shop or field with equipment recommended by the manufacturer of the studs and by qualified welders. Steel stud material, welding, and inspection shall be in accordance with AWS D1.1. End-weld in such a manner as to provide complete fusion between the end of the stud and the plate. There shall be no porosity or evidence of lack of fusion between the welded end of the stud and the plate.

H. TOLERANCES, STRAIGHTNESS & LENGTH

1. Conform to Standard No. 1.

I. SHOP CLEANING

1. Columns, beams, girders, and other members are to be cleaned of loose rust, heavy mill scale, oil, dirt, or other foreign substance.

J. SHOP PAINTING

1. Work Not Requiring Shop Painting:
 - a. Shop painting not required on steel to be hot-dipped galvanized, encased in concrete or masonry.
 - b. Do not shop paint surfaces of steel elements where a field weld or a high strength bolt connection is to be applied, unless prior written approval is provided by the Architect.

TECHNICAL SPECIFICATIONS

2. Surfaces Requiring Shop Painting:
 - a. Except for members specified above, all other surfaces shop painted after fabrication, before leaving fabricator's shop.
 - b. Paint embedded steel which is partially exposed in the exposed portions, and the initial 2" of embedded areas only.
3. Surface Preparation:
 - a. General: After fabrication, clean surfaces free of all mill scale, rust, oil, grease, weld slag, flux deposit, dirt and other foreign matter. Clean and prepare surfaces in exterior work in accordance with SSPC Specification SP6. Clean and prepare surfaces in interior work in accordance with SSPC Specification SP3.
 - b. Inaccessible Finished Surfaces: Except for contact surfaces as specified below, surfaces inaccessible after shop assembly shall be cleaned and prime painted as specified herein, prior to assembly. Apply two (2) coats; change color of the second coat to distinguish it from first coat.
 - c. Contact Finished Surfaces: Conform to Standard No. 1; clean and prepare surfaces in accordance with SSPC standards SP1 and SP3.
 - d. Surfaces Adjacent To Field Welds: Conform to Standard No. 1.
4. Shop Painting, Material and Application: Paint with one coat of primer specified above, except two (2) coats at inaccessible finished surfaces, by brush, spray, roller coating, flow coating or dipping at Contractor's option, applied to an even consistency to provide a uniform dry film thickness of not less than 1.5 mils per coat. Apply shop coat of prime paint within time limits recommended by pretreatment manufacturer.

PART 3 - EXECUTION

3.01 INSPECTION

A. Prior Work

1. Prior to starting work, carefully inspect installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
2. In the event of discrepancy, immediately notify the Architect.
3. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved. Beginning work constitutes acceptance of conditions as satisfactory.

3.02 STRUCTURAL METAL ERECTION

A. General

1. Comply with AISC specifications and "Code of Standard Practice," except as may be modified herein. Coordinate as required with other trades to assure proper and adequate provisions in the work of those trades for interface with the work of this Section. Exercise care to prevent damage due to handling, dropping or placement of members.
2. Furnish anchor bolts and templates, and other items as indicated, to other Sections for installation prior to placement of concrete.

TECHNICAL SPECIFICATIONS

3. Install the work of this Section in strict accordance with the original design, the approved shop drawings, pertinent requirements of governmental agencies having jurisdiction, and the manufacturers recommended installation procedures as approved by the Architect.
 4. Install in accurate locations and to lines and elevations indicated. Align and adjust members forming part of a complete frame or structure before fastening permanently. Adjust and shim as required to compensate for discrepancies in elevation and alignment. Level and plumb individual members of the structure within AISC tolerances; final assembly shall produce true alignment of axis without warp.
 5. Weld, securely anchor and install bracing and/or bridging before applying any loads, except the weight of the erectors. Anchor all components firmly into position for long life under hard use.
 6. Tighten and leave erection bolts in place after welding. Where high-strength bolts are required, provide identified and marked bolts. Install using procedure as hereinafter specified; mark tightened bolts.
 7. Drift pins shall not be used to enlarge unfair holes in main material. Holes that must be enlarged shall be reamed up to a maximum of 1/16th of an inch larger to admit bolts. Burning, drifting and reaming may be used to align unfair holes in members only after approval by the Owner's independent testing agency.
 8. Furnish shim plates or develop fills where required to obtain proper fit and alignment.
 9. Mutilate threads or use lock nuts for unfinished bolts to prevent nuts from backing off. Draw unfinished bolt heads and nuts tight against the work.
 10. Temporary erection angles and tack welds may be used to provide temporary support for architecturally exposed structural steel during erection. Temporary angles shall be removed and tack welds ground smooth after member is secured.
- B. Anchor bolts
1. Provide anchor bolts and other connectors required for securing structural steel to foundations and other in-place work.
 2. Provide templates and other devices necessary for presetting bolts and anchors to accurate locations.
- C. Bases and bearing plates: Shop weld to columns and members attached to concrete.
- D. Splicing
1. Splice members only where indicated unless, with the Architect's approval, splices not indicated would result in lower costs due to reduced shipping expense.
 2. For splices not indicated, submit structural calculations prepared and signed by a structural engineer licensed to practice in the State of Nevada.
 3. Fasten splices of compression members after bringing abutting surfaces completely into contact. Make all field connections by high-strength bolting or welding, unless otherwise noted.

TECHNICAL SPECIFICATIONS

E. Gas cutting

1. Do not use gas cutting torches for correcting fabricating errors in the structural framing.
2. Cutting will be permitted only in secondary members as acceptable to the Architect.
3. When gas cutting is permitted, finish the gas cut section to a sheared appearance acceptable to the Architect.

F. Surveys

1. Establish permanent benchmarks necessary for accurate erection of structural steel.
2. Check elevations of concrete surfaces, and locations of anchor bolts and similar items, before erection proceeds.
3. Submit erection survey data to Architect for review; to validate plumbness of the structural steel frame and to verify compliance with AISC erection tolerances.

G. Temporary shoring and bracing

1. Conform to Standard Nos. 1 and 2, as applicable.
2. Temporary bracing and guys shall be introduced wherever necessary to provide for loads and stresses to which the structure may be subjected, including those due to erection equipment and their operation and shall be left in place as long as it may be necessary for safeguarding all parts of the work.
3. Provide supplemental temporary structural steel support framing as needed. Remove temporary connections and members when permanent members are in place and the final connections have been made.

H. Setting bases and bearing plates

1. Clean concrete bearing surfaces free from bond-reducing materials, and then roughen to improve bond to the surface.
2. Clean the bottom surface of base and bearing plates.
3. Set loose and attached base plates and bearing plates for structural members in wedges or other adjusting devices.
4. Tighten anchor bolts after the supported members have been positioned and plumbed.
5. Do not remove wedges or shims but, if protruding, cut off flush with the edge of the base or bearing plate prior to packing with grout.
6. Pack grout solidly between bearing surfaces and bases or plates to assure that no voids remain.
7. Finish exposed surfaces, protect installed materials, and allow to cure in strict compliance with the manufacturer's recommendations as approved by the Architect.

TECHNICAL SPECIFICATIONS

I. Field assembly

1. Set structural frames accurately to the lines and elevations indicated.
2. Align and adjust members forming part of a complete frame or structure before fastening permanently.
3. Clean the bearing surface, and other surfaces which will be in permanent contact, before assembly.
4. Adjust as required to compensate for discrepancies in elevation and alignment.
5. Level and plumb individual members of the structure within specified AISC tolerances.
6. Establish required leveling and plumbing measurements on the mean operating temperature of the structure, making allowances for the difference between temperature at time of erection and the mean temperature at which the structure will be when completed and in service.
7. Comply with AISC specifications for bearing, adequacy of temporary connections, alignment, and the removal of paint on surfaces adjacent to welds.

3.03 TESTING AND INSPECTING

A. Testing

1. Costs of tests of identified stock will be paid by the Owner; except that if a test fails to comply with the specified requirements, the cost of testing will be paid by the Owner and back charged to the Contractor.
2. Costs of tests of unidentified stock will be paid by the Owner and back charged to the Contractor.
3. Test of mill order steel: Where structural steel, ordered from the mill and cut to lengths, is identified by heat or melt numbers and is accompanied by mill analysis or test reports, such material shall be used without further local test, provided an affidavit is given that the materials conform with the requirements of these Specifications. In case of controversy, tension and bend tests of the material either locally or at the mill, as required for local stock will be required.
4. Tests of unidentified steel: Where steel cannot be identified or its source is questionable, have one set of physical tests made for each 5 tons, or fraction thereof, for each size member and appropriately mark the steel to identify it with the test specimen. Have testing laboratory check the stock, select and mark test specimens, and make the required laboratory tests. Miscellaneous steel items such as angle clips, anchors and inserts need not be tested when Contractor submits written warranty as to their quality. Test reports shall be acceptable to the Architect prior to fabrication.
5. Additional tests may be required when deemed necessary by the Architect.

TECHNICAL SPECIFICATIONS

B. Inspecting

1. A complete four sided inspection of steel will be made when required by the Architect.
2. Cost of inspecting will be paid by the Owner subject to the same provisions made above for tests.
3. If, after fabrication and inspection, the work of this Section is found to be defective and to require reinspection, cost of such reinspection will be paid by the Owner and back charged to the Contractor.
4. Provide labor, equipment, and facilities needed to move and handle the materials to be inspected.

C. Welding inspection

1. Unless otherwise specified, perform welding under observation of a qualified inspector from a testing laboratory approved by the Architect.
2. Inspect every layer of weld for quality, penetration, and conformity with design requirements.
3. Require the welding inspector to submit a signed report to the Architect , verifying that:
 - a. The welding is adequate and was performed in conformity with the specified requirements; and
 - b. Adequate methods have been used to determine the quality of the welding.
4. The welding inspector may use gamma ray, magnaflux, trepanning, or any other aid to visual inspection considered necessary to assure adequacy of welding, or may use ultrasonic testing performed in accordance with pertinent requirements of governmental agencies having jurisdiction.
5. Cost of welding inspection will be paid by the Owner.

D. Access

1. Provide access for the testing agencies and inspectors to places where structural steel work is being fabricated or produced, so that required testing and inspecting may be accomplished.

E. Erection inspection

1. The Owner's testing and inspecting agency will inspect field welded connections, will perform such additional tests and inspections of field work as are required by the Architect, and will prepare test reports for the Architect's review.
2. The testing agency will conduct and interpret the tests, and will state in each report whether the inspected work complies with the requirements, specifically stating all deviations therefrom.

TECHNICAL SPECIFICATIONS

F. Corrections

1. Correct deficiencies in structural steel work which inspections and test reports indicate to be not in compliance with the specified requirements.
2. Perform additional tests required to reconfirm noncompliance of the original work and to show compliance of corrected work, all at no additional cost to the Owner.

3.04 FIELD PAINTING & FINAL CLEANING

A. Field Painting

1. General

- a. Prepare surface in a manner appropriate to the condition, and as approved by the Architect.
 - b. Clean spots and surfaces where primer coats have been removed, damaged, or burned off, and clean field bolts and other field connections not concealed in the finished Work.
 - c. Remove dirt, oil, and grease.
 - d. Apply one spot coat of the approved primer.
 - e. Do not apply paint to wet, damp, oily, or improperly prepared surfaces.
 - f. Repair galvanized coating using ASTM A780 zinc-rich paint.
2. Application – Notify the Architect when the work of this Section is ready to receive field painting.
 - a. Secure inspection and approval by the Architect prior to field painting.
 - b. Using spray or brush, as recommended by the manufacturer of the approved paint material, fill all joints and corners and cover the surfaces with a smooth unbroken film of at least 1.5 dry mils thickness, for each of the two required coats.

B. Final Cleaning

1. As erection on each area is completed, steel surfaces shall be left clean as previously specified.

END OF SECTION 05100

TECHNICAL SPECIFICATIONS

SECTION 05400 LIGHTGAGE METAL FRAMING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide all lightgauge metal framing, complete, in place, as shown on the Drawings, specified herein, or needed for a complete and proper installation.
- B. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.
- C. Related Work:
 - 1. Section 05500: Metal Fabrication
 - 2. Section 08100: Metal Doors and Frames
 - 3. Section 08710: Finish Hardware
 - 4. Section 09260: Gypsum Wallboard Systems
 - 5. Section 09510: Acoustical Ceilings

1.02 QUALITY ASSURANCE

- A. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Welding: Perform all shop and field welding required in connection with the work of this Section, adhering strictly to the current pertinent recommendations of the American Welding Society.
- C. Fire Resistance Rating: Where work is indicated for fire-resistance ratings, including those required to comply with governing regulations, provide materials and installations identical with applicable assemblies which have been tested and listed by recognized authorities, including UL.

1.03 REFERENCE STANDARDS

- A. American Welding Society (AWS)
- B. Underwriter's Laboratories (UL)

TECHNICAL SPECIFICATIONS

1.04 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.
- B. Manufacturer's Data:
 - 1. Complete materials list of all items proposed to be furnished and installed under this Section.
 - 2. Manufacturers' specifications and other data required to demonstrate compliance with specified requirements.

1.05 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. To the extent not otherwise indicated, comply with Gypsum Association Specification GA-216 "Application and Finishing of Gypsum Board" (as specified and recommended) for metal system supporting gypsum drywall work.

2.02 METAL STUDS

- A. Roll-formed metal studs of minimum No. 20-gage electrogalvanized steel, wide flange, screw-type studs. Cut lengths to fit the job conditions. Studs shall have openings for installation of conduit and wiring where such conditions are required by Drawings. Provide bridging where required. Provide No. 18-gage structural studs where required.
 - 1. Lower gage numbers (thickest material) supersede where more than one stud gage is specified or conflicts.
- B. Floor and Ceiling Runner Tracks: Sizes are required by the width of the studs, or as indicated on Drawings. Shall be formed of minimum No. 20-gage electrogalvanized steel with channel-shaped sections for use with specified studs.
- C. Stud System Accessories: Provide stud manufacturer's standard slips, shoes, ties, reinforcements, fasteners and other accessories as needed for a complete stud system.

TECHNICAL SPECIFICATIONS

2.03 FURRING CHANNELS

- A. Furring channels for horizontal framing and ceilings, vertical furring, backing for all fixtures and equipment, bracing, and anchorage shall be hot-rolled or cold-rolled steel channels, galvanized after rolling.
- B. Channels shall have the following minimum weights per 1,000 lineal feet:

<u>Size (Inches)</u>	<u>Hot-Rolled (Pounds)</u>	<u>Cold-Rolled (Pounds)</u>
3/4	300	300
1-1/2	1,120	475

- C. Hanger and Tie Wire: Galvanized and annealed low carbon steel; No. 8-gage for hanger wire and No. 16-gage for tie wire.
- D. Hanger Anchorage Devices: Size for 3 x calculated loads, except size direct-pull concrete inserts for 5 x calculated loads.
- E. Hat Channels: ASTM C-645; 25 gage.
- F. Resilient Furring Channels: Where shown as "resilient", provide manufacturer's special type designed to reduce sound transmission.
- G. Fasteners: Type and size recommended by furring manufacturer for the substrate and application indicated.

2.04 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION - METAL STUDS

- A. To the extent not otherwise indicated, comply with ASTM C754-88 "Installation of Steel Framing Members to Receive Screw Attached Gypsum Wallboard, Backing Board, or Water Resistant Backing Board", as specified and recommended for metal system supporting gypsum drywall work. All studs shall be fastened at top and bottom tracks with screws at both sides prior to installation of gypsum board.

TECHNICAL SPECIFICATIONS

- B. Align runner tracks accurately at both floor and ceiling and secure to the structural slabs with powder driven pins at not more than 24" o.c.
- C. Where partitions are indicated with sound insulation, install a resilient strip of 1/2" rubber, vinyl, or other preapproved resilient material, and twin beads of caulking between runner track and concrete slab.
- D. Where stud partitions abut underside of steel or concrete, cut studs short to relieve stress and install resilient filler strips and caulking on both sides of the partition. Install resilient clips for attachment of wallboard.
- E. Framing Around Door Openings: Provide double studs at each jamb. Run studs continuously through the suspended ceilings and securely attached to the structural slabs above. Screw anchor or otherwise secure studs to jamb anchors. Install jack studs to metal runner track within head of frames and to the runner track at ceiling. Provide additional horizontal bracing where openings exceed 42" in width.
- F. Vertical Furring: Freestanding or braced type, as required to fit the indicated conditions on Drawings. Align runners at both floor and ceiling and secure to concrete slabs with powder driven pins at no more than 24" centers; or wire the runners or vertical channels to the ceiling construction as conditions will permit. Furring and nailing channels shall not be forced into place. Fasten studs to runners securely, to ceiling or construction above, or directly to floor. Secure horizontal furring or screw channels to studs, spaced 16" o.c. vertically for attachment of gypsum wallboard.
- G. Provide adequate bridging between the studs for installation of accessories, lavatories and other wall-hung fixtures.
- H. Install metal backing for wall-mounted accessories, suspended fixtures or other equipment which are to be mounted on gypsum board surfaces.

3.03 INSTALLATION - METAL FRAMING FOR SUSPENDED CEILINGS

- A. Space hangers not over 2'-8" o.c. in the direction of the 1-1/2" main runner channels and not over 4'-0" o.c. in the direction at right angles to main runners and within 6" of main runner ends and of the boundary walls, girders or similar interruption of the ceiling continuity.
- B. Place main runners not over 4'-0" o.c., properly position, level and saddle-tie hangers along runners. Main runner shall not come in contact with abutting walls. Space runner channels within 6" of the walls to support ends of the furring channels.
- C. Space drywall screw channels 16" o.c. and securely clip or saddle-tie with tie wire to the main runners. Provide end splices by nesting the channels no less than 8", and securely wire-tie.
- D. At lights or other openings that interrupt the main runner or furring channels, reinforce grillage with 3/4" cold-rolled channels wire-tied atop and parallel to main runner channel.
- E. Brace framing as required for seismic requirements per applicable codes as recommended by the manufacturer.

TECHNICAL SPECIFICATIONS

- F. Duct Interference: Where wide air conditioning ducts interfere with suspension hangers, provide independent framing below ductwork to support ceiling as an obligation under this section. Support framing from the floor or roof structure above. Do not attach framing to ductwork or any other system.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 05500 METAL FABRICATIONS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Drawings and general provisions of the Contract Documents including General, Supplemental and other Conditions and Division 1, "General Requirements" Sections, apply to the work specified in this Section.
- B. The extent of the miscellaneous metal work is indicated on the drawings, which includes, whether specifically specified herein or not, all items fabricated from iron and steel shapes, plates, bars, strips and pipes which are not a part of structural steel or other metal systems in other sections of these specifications. Also included is the design, layout, fabrication and installation of the Wash Bay Steel Catwalk and Stairs.
- C. Related Sections
 - 1. Division 3 Section "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, wedge-type inserts and other items indicated to be cast into concrete.
 - 2. Division 5 Section "Structural Steel".
 - 3. Coordinate with all applicable sections of these specifications for related work where miscellaneous metals work is to be used.

1.02 QUALITY ASSURANCE

- A. Standard Specifications: Comply with the provisions of the following codes, standards and specifications, except as otherwise shown or specified:
 - 1. AISC "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings", and including "Commentary of the AISC Specifications".
 - 2. AISC "Specification for the Design of Cold-Formed Steel Structural Members".
 - 3. AWS "Structural Welding Code".
- B. Qualifications for Welding Work
 - 1. Qualify welding processes and welding operators in accordance with the AWS "Standard Qualification Procedure".

1.03 SUBMITTALS

- A. Manufacturer's Data
 - 1. Submit manufacturer's specifications, dimension diagrams, anchor details and installation instructions for products to be used in the fabrication of miscellaneous metal work, including paint products.

TECHNICAL SPECIFICATIONS

- a. Provide verification and certification that the metal fabrications supplied for this project were manufactured and fabricated so as to comply with "Buy America" requirements.

B. Shop Drawings

1. Submit **complete**, checked shop drawings.
2. Include shop drawings for the fabrication and erection of all assemblies of miscellaneous metal work, including the Wash Bay Catwalk and Stairs, which are not completely shown by the manufacturer's data sheets.
3. Include all details, elevations, welding and other connections, zinc-coating and shop painting information and dimensions; coordinate with connecting and adjacent work; show anchorage and accessory items.
4. Include plans and elevations at not less than 1" to 1'-0" scale, and include details of sections and connections at not less than 3" to 1'-0" scale.
5. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed by other trades.
6. Shop drawings are interpretations of and are supplemental to the design drawings and specifications. Their intent is to demonstrate to Architect that this Contractor has understood the design concept, and to provide detailed information necessary for the fabrication, assembly, and installation of the products and materials specified. Neither the shop drawings nor comments placed on them by the Architect shall be construed as being change orders.

1.04 JOB CONDITIONS

A. Field Measurements

1. Take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of the work. However, do not delay job progress; allow for trimming and fitting wherever the taking of field measurements before fabrication might delay the work.

B. Inserts & Anchorages

1. Furnish inserts and anchoring devices which must be set in concrete and/or welded to building components for the installation of miscellaneous metal work. Coordinate delivery with other work to avoid delay.

C. Shop Assembly

1. Pre-assemble items in the shop to the greatest extent possible, so as to minimize field splicing and assembly of units at the project site.
2. Disassemble units only to the extent necessary for shipping and handling limitations.
3. Clearly mark units for re-assembly and coordinated installation.

TECHNICAL SPECIFICATIONS

PART 2 - PRODUCTS

2.01 MATERIALS: All materials for this project shall comply with "Buy America" requirements.

A. Materials – General

1. Metal Surfaces, General: For the fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surface finishes including zinc coatings.
2. Steel Plates, Shapes and Bars: ASTM A36.
3. Steel Plates to be Bent or Cold-Formed: ASTM A283, Grade C.
4. Cold-Finished Steel Bars: ASTM A108, grade as selected by fabricator.
5. Hot-Rolled Carbon Steel Sheets and Strips: ASTM A568 and ASTM A569; pickled and oiled.
6. Cold-Rolled Carbon Steel Sheets: ASTM A 366.
7. Galvanized Carbon Steel Sheets: ASTM A653, with hot-dip galvanized coat complying with ASTM A924, G90.
8. Steel Pipe: ASTM A53, type as selected; Grade A; black finish; standard weight (schedule 40), except where otherwise shown or specified as stronger. All HSS guardrail vertical posts shall comply with ASTM A500, Grade B, $F_y = 42$ ksi.
9. Steel Tubing: ASTM A500, Grade B, $F_y = 42$ ksi, UNO.
10. Stainless Steel: Type 304, ASTM A167, with AISI 2D finish, deal soft, fully annealed.
11. Aluminum: Furnish extruded shapes of 6061-T6 alloy, of gauges, shapes and sizes required, unless otherwise specifically specified herein.

B. Anchors

1. Threaded-Type Concrete Inserts: Galvanized ferrous castings, internally threaded to receive machine bolts; malleable iron ASTM A27; hot-dip galvanized.
2. Wedge-Type Concrete Inserts: Box-type ferrous castings, designed to accept bolts having special wedge-shaped heads; malleable iron ASTM A47, or cast steel ASTM A27; hot-dip galvanized.
3. Slotted-Type Concrete Inserts: 1/8" thick pressed steel plate, ASTM A283; box-type welded construction with slot design to receive square head bolt and with knockout cover; hot-dip galvanized.

C. Fasteners

1. General: Provide zinc-coated fasteners for exterior or Wash Bay use or where built into exterior walls.
2. Standard Bolts and Nuts: ASTM A307, Grade A, regular hexagon head.

TECHNICAL SPECIFICATIONS

3. Lag Bolts: Hex head type complying with Federal Spec FF-B-561.
4. Machine Screws: Cadmium plated steel complying with Federal Spec FF-S-111.
5. Plain Washers: Round, general assembly grade carbon steel complying with Federal Spec FF-W-92.
6. Lock Washers: Helical spring type carbon steel complying with Federal Spec FF-W-84.

D. Zinc Coating

1. Except as further specified below, where noted in this Section that ferrous metal items are to be zinc-coated or galvanized, provide by the "hot-dip" method, in accordance with ASTM A123, of the following coating weight per square foot of actual surface:

Steel under 1/16"	:	1.1 oz. average, 1.8 oz. min.
Steel 1/16" to under 1/8"	:	1.5 oz. average, 1.8 oz. min.
Steel 1/8" to under 1/4"	:	2.0 oz. average, 1.8 oz. min.
Steel 1/4" and heavier	:	2.3 oz. average, 2.0 oz. min.

2. Galvanize bolts and similar threaded fasteners in accordance with ASTM A153, Class A, B, C and D, as applicable.
3. Steel pipe shall be galvanized in accordance with ASTM A53.
4. Steel sheet in coils and cut lengths shall be galvanized in accordance with ASTM A924, G-60 or G-90 specifications, as applicable.
5. Furnish certificate from plating firm attesting to conformance with Specifications for steel plates and shapes.

E. Metal Primer Paint

1. Zinc-Coated (Galvanized) Material: As required. Furnish zinc-rich primer for re-galvanizing welds in galvanized steel, complying with Steel Structures Painting Council (SSPC) Painting System Guide PS12.01.
2. All Other Ferrous Metals - Concealed in the Completed Work: Furnish Tnemec Company, Inc. "FD88 Azeron Primer", or approved, lead-free, high solids primer, meeting or exceeding performance requirements of Federal Specification TT-P-86G, Type I. At fabricator's option, primer as specified below for 'exposed' applications may be used for 'concealed' work.
3. All Other Ferrous Metals - Exposed in the Completed Work: Furnish Tnemec "Series 37 Chem-Prime" or Sherwin Williams "Kem Kromik Universal Metal Primer", or approved, chromate-free rust inhibitive universal alkyd-phenolic primer compatible with high performance primer and finish coats as specified.

F. Grout for Installation of Metal Fabrication

1. For general use, furnish Master Builders "Masterflow 928 Grout", or approved, "flowable" consistency, with a minimum compressive strength in 28 days of 7000 psi.

TECHNICAL SPECIFICATIONS

2.02 FABRICATION - GENERAL

A. General

1. Use materials of the size and thicknesses shown or, if not shown, of the required size and thickness to produce adequate strength and durability in the finished product for the intended use. Work to the dimensions shown or accepted on shop drawings, using proven details of fabrication and support. Use the type of materials shown or specified for the various components of the work.
2. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32" unless otherwise shown. Form bent-metal corners to the smallest radius possible without causing grain separation or otherwise impairing the work; punch and shear leaving clean and true surfaces.
3. Weld corners and seams continuously and in accordance with the recommendations of AWS. Grind exposed welds smooth and flush, to match and blend with adjoining surfaces.
4. Form exposed connections with hairline joints which are flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of the type shown or, if not shown, use Phillips flathead (countersunk) screws or bolts.
5. Provide holes, cuts and connections, where shown, for work of other trades. Provide for anchorage of the type shown, coordinated with the supporting structure and the progress schedule. Fabricate and space anchoring devices as shown and as required to provide adequate support for the intended use of the work.
6. Use hot-rolled steel bars for work fabricated from bar stock, unless work is indicated to be fabricated from cold-finished or cold-rolled stock.
7. Detail joints and fastenings for ample strength and stiffness as shown or approved; conceal fastenings wherever possible.
8. Form joints to exclude water, where exposed to elements.

B. Shop Painting

1. Zinc-coated (galvanized) material: Not required unless specifically noted otherwise.
2. All other ferrous metals:
 - a. Remove all mill scale, rust, loose rust, oil, grease, dirt and foreign matter. Clean and prepare surfaces in exterior work in accordance with SSPC Specification SP6. Clean and prepare surfaces in interior work in accordance with SSPC Specification SP3.
 - b. Apply one brush or airless spray coat primer coating of applicable type as specified above, as applicable, applied to all exposed surfaces after fabrication, dry film thickness as specified above.

TECHNICAL SPECIFICATIONS

2.03 FABRICATION – MISCELLANEOUS STEEL ITEMS

A. Railings, Handrails & Guardrails

1. General:

- a. Fabricate HSS vertical guardrail posts from material conforming to ASTM A500 Grade B, $F_y = 42$ ksi. Fabricate all other members from ASTM A53 schedule 40 "standard" steel pipe and ASTM A36 steel plate, bar, rod and angle members of sizes and configurations shown for the various exterior and interior conditions and applications, all joints welded and ground smooth.
- b. Fabricate guardrails, railings and handrails accurately, level with finish floor or sloped to match angle of stair and ramp construction, as applicable. Radius steel pipe handrails and railings at corners and ends as shown.
- c. Jointing of posts, rail and corners, except radiused corners, shall be by mitered and welded joints made by fitting vertical posts to top rail and intermediate rails to vertical posts, mitering corners, except radiused corners, groove welding joints, and grinding smooth. Radiused corners shall be bent to shapes indicated, with bends made in a suitable jig such that pipe is not crushed.
- d. Exposed ends of rails, closed, welded and welds ground smooth.
- e. Vertical members of railings one piece to underside of top rail.
- f. After fabrication, galvanize exterior members, where so indicated by the Architect.

2. Pipe Sleeves for Vertical Members Set in Concrete: Fabricate from galvanized steel pipe to size shown, for recessed installation in concrete.

3. Pipe Plate Supports for Vertical Members Set on Steel Framing: Fabricate from steel plate to size and shape shown, complete with threaded studs with bolts welded to bottom side, for securing to steel framing.

4. Pipe Plate Supports for Vertical Members Returns at CMU Walls: Fabricate integral with railing supports from steel plate to size and shape shown, welded to railing returns, complete with holes for threaded anchor bolts set in masonry wall.

5. Handrail Brackets: For handrails mounted to steel framing, concrete or masonry wall construction, provide of radiused 3/4-inch round steel rod, formed to size and shape as detailed, complete with steel plate mounting flange.

B. Fixed and Removable Steel Pipe Bollards

1. Provide ASTM A53 schedule 40 steel pipe, diameter and length as required for conditions shown.

2. Unless otherwise shown, bollards shall extend 4'-0" above adjacent finish grade and be set in concrete footing and filled with concrete as detailed and specified on the Drawings.

C. Steel Angle Edgings at Interior Concrete Floor Edges

1. Fabricate from ASTM A36 steel angle members of sizes and to configurations shown at exposed perimeter top edges of concrete floor slabs. Furnish complete with 1/2 inch round nelson stud anchors welded to back for anchorage to concrete.

2. Space anchors not over 6 inches from ends of each angle member and not more than 24 inches apart between.

3. All steel members prime painted after fabrication.

TECHNICAL SPECIFICATIONS

D. Louver Frame Stops

1. Fabricate from ASTM A36 steel angle and flat bar members of sizes and to configurations shown or otherwise required for each wall louver opening, with all connections fully welded and ground smooth; refer to applicable details Section 21 of Project Manual Volume II, plus related drawings and details.
2. Drill holes of size and in locations required for bolted connections and for securement of louvers.
3. All steel members galvanized after fabrication.

E. Wash Bay Catwalk and Stairs

1. Provide the design of the catwalk and stairs based on given codes and design criteria, including all required lateral and longitudinal bracing.
2. Fabricate the stairs and catwalk walking surfaces using galvanized grating. Fabricate all steel posts, stringers, and connections based on the approved design. All non-galvanized members shall be coated with a primer coat and two (2) finish coats Alkali Enamel as specified.
3. Design of catwalk and stairs shall be such that it can be brought in, in finished sections, and bolted together in the field, using galvanized bolts.

F. Other Items

1. Furnish all other miscellaneous metal fabrication items shown on Drawings and not classed as structural steel. Generally this includes steel angle jamb supports for overhead doors and shutter guides, and the like. Fabricate accurately.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions and directions for the installation of anchorages, such as concrete inserts, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete construction. Coordinate the delivery of such items to the project site.

3.02 SURFACE CONDITIONS

- A. Prior to installation of work in this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where installation of the work of this Section may properly commence
- B. Verify that miscellaneous metal items have been fabricated for installation in strict accordance with the original design and the approved shop drawings.
- C. In the event of discrepancy, immediately notify the Architect. Do not proceed with installation of miscellaneous metal items in areas of discrepancy until all such discrepancies have been fully resolved.

TECHNICAL SPECIFICATIONS

3.03 MANUFACTURED ITEMS

- A. Immediately after erection, clean the field welds, bolted connections, and abraded areas of shop rimming. Paint the exposed areas with same material used for shop priming, to the same required thickness.

3.04 INSTALLATION – FABRICATED ITEMS

A. Installation - General

1. Fastening to in-place construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal item to in-place construction; including threaded fasteners for concrete inserts, toggle bolts, through-bolts, lag bolts and other connectors as required.
2. Cutting, fitting & placement:
 - a. Perform all cutting, drilling, and fitting required for installation of the miscellaneous metal items. Set the work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels.
 - b. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, or similar construction.
 - c. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations.
 - d. Grind joint smooth and touch-up shop paint coat.
 - e. Do not weld, cut or abrade the surfaces of units which have been hot-dip galvanized after fabrication, and are intended for bolted field connections.

B. Guardrails, Railings & Handrails

1. Erect guardrails, railings, and handrails as detailed and shown on Drawings and applicable Details for the various construction types and conditions, in all locations shown on Drawings, true to line.
2. Set vertical members into pipe sleeves where set in concrete, secured with metal wedges and grout with "Por-Rok" or approved non-shrink grout; slope top of grout to drain away from pipe support.
3. Secure guardrails and stair handrails and railings with brackets secured to wall construction as shown for the various conditions.
4. Fully weld vertical members to steel edgings and stringer supports as shown and otherwise required for metal structures.

C. Steel Angle Edgings at Interior Concrete Floor Edges

1. Install as detailed and otherwise required for the conditions of the work, securely anchored to concrete floor and loading dock construction as shown; coordinate with cast-in-place concrete work specified under Section 03300.

D. Louver Frame Stops

1. Install louver frame stops plumb, true to line, bolted to adjacent construction as shown or otherwise required for supporting wall louvers in each applicable condition; coordinate

TECHNICAL SPECIFICATIONS

installation with light gauge metal framing work and louver installation covered under Division 15.

E. Wash Bay Catwalk and Stairs

1. Install the prefabricated sections of catwalk and stairs using field bolted galvanized connections, per the approved shop drawings.

F. Other Fabricated Items

1. Install all other steel items as specified above and as otherwise shown on Drawings and not classed as structural steel.
2. Install as detailed or required for rigidity and permanence.
3. Grind all welds smooth in fabrication work to be left exposed in completed work.

F. Touch-Up Painting

1. Cleaning and touch-up painting of field welds, bolted connections and abraded areas of the shop paint on miscellaneous metal items are specified in "Painting" Sections of these specifications.

END OF SECTION 05500

TECHNICAL SPECIFICATIONS

SECTION 06100 ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide wood, nails, bolts, screws, framing anchors and other rough hardware, and other items needed, and perform rough carpentry for the construction shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.02 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Codes and standards:
 - 1. In addition to complying with the pertinent codes and regulations of governmental agencies having jurisdiction, unless otherwise specifically directed or permitted by the Architect, comply with:
 - a. "Product Use Manual" of the Western Wood Products Association for selection and use of products included in that manual;
 - b. "Plywood Specification and Grade Guide" of the American Plywood Association;
 - c. "Standard Specifications for Grades of California Redwood Lumber" of the Redwood Inspection Bureau for Redwood, when used.
 - d. National design specifications for wood construction (NDS) of the American Forest and Paper Association.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Protection:
 - 1. Deliver the materials to the job site and store, in a safe area, out of the way of traffic, and shored up off the ground surface.
 - 2. Identify framing lumber as to grades, and store each grade separately from other grades.
 - 3. Protect metals with adequate waterproof outer wrapping.
 - 4. Use extreme care in off loading of lumber to prevent damage, splitting, and breaking of materials.

TECHNICAL SPECIFICATIONS

PART 2 - PRODUCTS

2.01 GRADE STAMPS

- A. Identify framing lumber by the grade stamp of the West Coast Lumber Inspection Bureau, or such other grade stamp as is approved in advance by the Architect.
- B. Identify plywood as to species, grade, and glue type by the stamp of the American Plywood Association.
- C. Identify other materials of this Section by the Appropriate stamp of the agency approved in advance by the Architect.

2.02 MATERIALS

- A. Provide materials in the quantities needed for the Work shown on the Drawings, and meeting or exceeding the following standards of quality, unless otherwise noted on the drawings:
 - 1. Horizontal framing members: Douglas Fir-Larch, NDS Table 4A or 4D, No. 1 or better for members larger than 2x10; NDS Table 4A or 4D, No. 2 or better for 2x10 and smaller members.
 - 2. Vertical framing members: Douglas Fir-Larch, NDS Table 4A or 4D, No. 2, or better. Posts shall be Douglas Fir No. 1, or better.
 - 3. Plates shall be Douglas Fir-Larch, NDS Table 4A or 4D, No. 2, or better. Nailers, bridging, and blocking: Douglas Fir-Larch NDS Table 4A, No. 2, or better.
 - 4. Moisture content of framing lumber shall not exceed 19% by weight at time of installation.
 - 5. Plywood: (PS-1 plywood bearing the APA trademark of the American Plywood Association.)
 - a. Sheathing: Plywood or Oriented-Strand-Board sheathing with exterior glue, grades and sizes as shown on the Drawings.
 - b. Backboard: 3/4" thick A/D, group 1, interior.
 - 6. Wood Preservative: Ammoniacal copper arsenite, or 5% solution of pentachlorophenol. All wood in contact with earth, with concrete slabs on grade, and with concrete or masonry foundations shall be pressure preservative treated Douglas Fir, or foundation grade redwood.
 - 7. Rough hardware:
 - a. Steel items:
 - (1) Comply with ASTM A7 or ASTM A36.
 - (2) Use galvanized at exterior locations.
 - b. Machine bolts: Comply with ASTM A307.
 - c. Lag bolts: Comply with Fed Spec FF-B-561.
 - d. Nails:

TECHNICAL SPECIFICATIONS

- (1) Use common of the gage and size noted in NDS Table No. 12.3B.
 - (2) Comply with Fed Spec FF-N-1.
 - (3) Use galvanized at exterior locations.
 - (4) All nails used for plywood nailing shall be deformed shank common nails of the size shown on the drawings, whether for floor plywood, roof plywood, or wall plywood.
- e. Joist hangers: Simpson, Silver, or equal as approved by the Architect, having ICC approval.
 - f. All framing anchors, connections, nails, etc. that are attached to pressure treated wood shall have the proper protective finish as required for that pressure treated material.
8. Microlams: Microlam members shall be minimum 1.9E "MICRO-LAM" as manufactured by Trus Joist, or approved equal, having ICC approval.
 9. Parallel Strand Lumber: Parallam members shall be minimum 2.0E "Parallam" as manufactured by Trus Joist, or approved equal, having ICC approval.

2.03 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to approval of the Architect.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which all work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 DELIVERIES

- A. Stockpile materials sufficiently in advance of need to assure their availability in a timely manner for this Work.
- B. Make as many trips to the job site as are needed to deliver materials of this Section in a timely manner to ensure orderly progress of the Work.

3.03 COMPLIANCE

- A. Do not permit materials not complying with the provisions of this Section to be brought onto or to be stored at the job site.
- B. Promptly remove non-complying materials from the job site and replace with materials meeting the requirements of this Section.

TECHNICAL SPECIFICATIONS

3.04 WORKMANSHIP

- A. Produce joints which are tight, true, and well nailed, with members assembled in accordance with the Drawings and with pertinent codes and regulations.
- B. Selection of lumber pieces:
 - 1. Carefully select the members.
 - 2. Select individual pieces so that knots and obvious defects will not interfere with placing bolts or proper nailing, and will allow making of proper connections.
 - 3. Cut out and discard defects which render a piece unable to serve its intended function.
 - 4. Lumber may be rejected by the Architect, whether or not it has been installed, for excessive knots, splits, warp, twist, bow, crook, mildew, fungus, or mold, as well as for improper cutting and fitting.
- C. Do not shim any framing component.

3.05 GENERAL FRAMING

- A. General:
 - 1. In addition to framing operations normal to the fabrication and erection indicated on the Drawings, install wood blocking and backing required for the work of other trades.
 - 2. Set horizontal and sloped members with crown up.
 - 3. Do not notch, cut, or bore members for pipes, ducts, or conduits, or for other reasons except as shown on the Drawings or as specifically approved in advance by the Architect. Cutting or notching of wood studs per IBC 2308.9.10 will not be allowed.
- B. Bearings:
 - 1. Make bearings full unless otherwise indicated on the Drawings.
 - 2. Finish bearing surfaces on which structural members are to rest so as to give sure and even support.
 - 3. Where framing members slope, cut or notch the ends as required to give uniform bearing surface.

3.06 BLOCKING AND BRIDGING

- A. Install blocking as required to support items of finish and to cut off concealed draft openings, both vertical and horizontal, between ceiling and floor areas. Also provide blocking at all unsupported wall sheathing edges, at edges of all roof and wall openings, and as required for a complete and proper installation.

TECHNICAL SPECIFICATIONS

B. Bridging:

1. Install wood cross bridging (not less than 2" X 3" nominal), metal cross bridging of equal strength, or solid blocking between joists where shown.
2. Cross bridging may be omitted for roof and ceiling joists where the omission is permitted by code, except where otherwise indicated on the Drawings.
3. Install solid blocking between joists at points of support, and where shown on the Drawings. Blocking may be omitted where joists are supported on metal hangers, unless shown otherwise on the Drawings.

3.07 ALIGNMENT

- A. On framing members to receive a finished surface, align the finish subsurface to vary not more than 1/8" from the plane of surfaces of adjacent furring and framing members.

3.08 INSTALLATION OF PLYWOOD SHEATHING

A. Placement:

1. Place horizontal plywood with face grain perpendicular to supports and continuously over at least two supports, except where otherwise shown on the Drawings. Place vertical plywood with face grain parallel to supports with supports or blocking at all plywood edges.
2. Center joints accurately over supports, unless otherwise shown on the Drawings.

- B. Protect plywood from moisture by use of waterproof coverings until the plywood in turn has been covered with the next succeeding component or finish.

3.09 FASTENING

A. Nailing:

1. Use only common wire nails or spikes of the dimensions shown on the Drawings and the IBC Nailing Schedule, except where otherwise specifically noted. Use deformed shank nails where shown and on all plywood wall, floor, and roof sheathing.
2. For conditions not covered in the Nailing Schedule provide penetration into the piece receiving the point of not less than 1/2 the length of the nail or spike, provided, however, that 16d nails may be used to connect two pieces of 2" (nominal) thickness.
3. Nail without splitting wood.
4. Prebore as required.
5. Remove split members and replace with members complying with the specified requirements.

TECHNICAL SPECIFICATIONS

6. Care shall be taken to ensure proper placing and nailing of all plywood for walls and roofs. Comply with the recommendations of the American Plywood Association, and as noted herein. Unless otherwise noted, provide 1/8" and 1/8" spacing for plywood sheathing at the end and edge joints respectively. Start nailing sheets of plywood at the end or side closest to the plywood sheet previously installed, and then progress with the nailing across the panel, from the initial side to the opposite side or end. Do not nail the four corners of the panel initially and then nail the field.

B. Bolting:

1. Drill holes 1/16" larger in diameter than the bolts being used.
2. Drill straight and true from one side only.
3. Do not bear bolt heads on wood, but use washers under head and nut where both bear on wood, and use washers under all nuts.

C. Screws:

1. For lag screws and wood screws, prebore holes same diameter as root of threads, enlarging holes to shank diameter for length of shank.

END OF SECTION 06100

TECHNICAL SPECIFICATIONS

SECTION 06181 GLUE LAMINATED STRUCTURAL UNITS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide glue-laminated beams as indicated on the Drawings, specified herein, and needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.02 SUBMITTALS

- A. Product data: Submit:
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Shop Drawings showing pertinent details of the units and their interface with other components of the structure.
 - 3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for acceptance or rejection of actual installation procedures used on the Work.
 - 4. The shop drawings are interpretations of and are supplemental to the design drawings and specifications. Their intent is to demonstrate to the Architect that this Contractor has understood the design concept, and to provide the detailed information necessary for the fabrication, assembly and installation of the products or materials specified. Neither the shop drawings nor comments placed on them by the Architect shall be construed as being change orders.
- B. Upon completion of this portion of the Work, and as a condition of its acceptance, deliver to the Architect an AITC "Certificate of Conformance" covering all glue-laminated structural members.

1.03 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. In addition to complying with pertinent codes and regulations of governmental agencies having jurisdiction, comply with:
 - 1. AITC 117, "Design Standard Specifications for Structural Glued Laminated Timber of Softwood Species" of the American Institute of Timber Construction;

TECHNICAL SPECIFICATIONS

2. "Inspection Manual 200" of the American Institute of Timber Construction.

- C. For all glue-laminated structural members, mark each member with the "Quality Mark" of the American Institute of Timber Construction, and provide the specified AITC "Certificate of Conformance."

1.04 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage:

1. Deliver the units to the job site with adequate wrapping to prevent staining and other damage from moisture.
2. Maintain wrapping in proper condition until erection has started.

PART 2 - PRODUCTS

2.01 GLUE-LAMINATED BEAMS

- A. Provide glue-laminated beams of the types and dimensions shown on the Drawings, "Architectural" appearance grade where exposed, "Industrial" appearance grade where concealed using exterior glue, meeting the requirements of combination 24F-V4 at simple spans, combination 24F-V8 where continuous over supports, for dry condition of service, and complying with AITC 117, with each unit bearing the AITC stamp of quality inspection. Seal the ends of the beams after manufacture.
- B. Simple span glue-laminated beams shall be cambered as indicated on the Plans. Where no camber is indicated, simple span members shall be cambered up 2000 foot radius or nearest standard camber.

2.02 HARDWARE

- A. Provide connection steel and hardware for joining timber members to each other and to their supports; exclusive of anchorage embedded in masonry, setting plates, and items field welded to structural steel. Provide one coat of rust-inhibitive shop-applied primer on connection steel and hardware.

2.03 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

TECHNICAL SPECIFICATIONS

3.02 INSTALLATION

- A. Install the work of this Section in strict accordance with the Shop Drawings and manufacturer's recommendations as approved by the Architect, and with the requirements of governmental agencies having jurisdiction.
- B. Procedures:
 - 1. Do not impose temporary construction loads which cause stress beyond design limits.
 - 2. Erect bracing as required to maintain the system level, straight and plumb.
 - 3. Assure adequate lateral support until the other structural members have been completely installed.

END OF SECTION 06181

TECHNICAL SPECIFICATIONS

SECTION 06195 PREFABRICATED WOOD BEAMS & JOISTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work included: Provide prefabricated wood beams and joists where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.02 SUBMITTALS

- A. Submit:
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Shop Drawings showing pertinent details of the units and their interface with other components of the structure.
 - 3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for acceptance or rejection of actual installation procedures used on the Work.

1.03 QUALITY ASSURANCE

- A. Deliver materials of this Section to the job site in bundles banded together for handling and shipping.

PART 2 - PRODUCTS

2.01 PREFABRICATED WOOD CHORD JOISTS

- A. Design is based on products of Trus Joist Corporation, and nomenclature of that manufacturer is used herein. Equal products of other manufacturers having ICC approval will be acceptable only when approved in advance by the Architect.
- B. General:
 - 1. Size and detail the work of this Section to fit the dimensions and loads indicated on the Drawings.
 - 2. Design in accordance with allowable values and section properties assigned and approved by the governmental agencies having jurisdiction.

TECHNICAL SPECIFICATIONS

C. Plywood web joists:

1. Provide "TJI" units, factory made with structural grade plywood, "Micro-Lam" or machine stress related lumber flanges, and utilizing waterproof type glues.

D. Wood Chord and Metal Web Joists:

1. Provide wood chord metal joists, factory made with tubular steel webs, structural wood chords, and true pin connections located at intersections of the centroids of web and chord members, of types shown on the Drawings.

E. Microllam Lumber: Provide Microllam E1.9 (LVL) units.

F. Parallel Strand Lumber: Provide Parallam E2.0 (PSL) units.

2.02 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Install the work of this Section in strict accordance with the Shop Drawings and manufacturer's recommendations as approved by the Architect.
- B. Procedures:
 1. Do not impose temporary construction loads which cause stress beyond design limits.
 2. Erect bracing and bridging as required to maintain the units straight and plumb.
 3. Assure adequate lateral support until the sheathing material has been applied.

END OF SECTION 06195

TECHNICAL SPECIFICATIONS

SECTION 06412
PLASTIC FACED CABINET WORK

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide all plastic faced cabinet work shown on the Drawings, complete, in place, as specified herein. This includes cabinets, cases, counter tops, hardware, scribe strips, filler panels, bases, furring strips and all other items required for a complete and proper installation.
- B. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.
- C. Related Work:
 - 1. Section 15400: Plumbing

1.02 QUALITY ASSURANCE

- A. Qualifications of Manufacturer: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production. The cabinet work must, in the Architect's opinion, be equal to that specified and conform to the design indicated with a comparable color selection.
- B. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- C. Issue a W.I. Certified Compliance Certificate prior to delivery certifying that products fully meet all the requirements of the W.I. grade specified. Apply the W.I. Certified Compliance Label to each elevation of casework.

1.03 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.
- B. Manufacturer's Data:
 - 1. For information only, submit 2 copies of manufacturer's specifications and installation instructions for hardware, plastic laminates, plywood and other materials used in the fabrication of casework, as required to show compliance with these specifications. Indicate by transmittal form that copy of each instruction has been distributed to the Installer.

TECHNICAL SPECIFICATIONS

C. Shop Drawings:

1. Submit shop drawings for casework, showing location of each item, dimensioned plans and elevations, large scale details, anchors and other components. Shop drawings shall bear the W.I. Certified Compliance Label on the first page of the submittal.

D. Samples:

1. Submit three (3) plastic laminate color samples showing the manufacturer's "complete" range of colors.

1.04 REFERENCE STANDARDS

- A. Woodwork Institute (W.I.).

1.05 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 PLASTIC FACED CABINET WORK

A. Acceptable Manufacturers:

1. B & C Cabinets & Millwork, 5241 Metric Way, Carson City, Nevada
2. Powell Cabinets & Fixture Co., 1300 Freeport Blvd., Sparks, Nevada
3. Robertson Cabinets & Fixtures, 16 Kit Kat Drive, Suite A, Moundhouse, Nevada
4. Approved equal.

B. Plastic Laminate:

1. Acceptable Manufacturers:
 - a. Formica
 - b. Wilson Art
 - c. Nevamar
 - d. Micarta
 - e. Approved equal.
2. 1/16" laminate plastic.

TECHNICAL SPECIFICATIONS

3. Colors and Design: As selected by the Architect from the manufacturer's "complete" range of colors. The Architect shall not be limited in his selection to the "standard" range of colors.

C. Hardware:

1. Acceptable Manufacturers:

- a. Accuride
- b. Knape & Vogt
- c. Grass America, Inc.
- d. National Lock
- e. Blum
- f. Epco
- g. Stanley Hardware
- h. Hettich
- i. Approved equal.

2. Door and Drawer Pulls:

- a. 5/16" diameter aluminum bar; 4" center to center; 1" clearance.
- b. Finish: Brushed Aluminum

3. Hinges:

- a. Snap On 3000 Series.
- b. Approved equal.

4. Standard Drawer Slides:

- a. Accuride #C7434
- b. Approved equal.

5. File Drawer Slides:

- a. Accuride #C4034
- b. Approved equal.

6. Lateral File Drawer Slides:

- a. Accuride #C4034
- b. Approved equal.

7. Door Locks:

- a. National #C-8149
- b. Approved equal.

TECHNICAL SPECIFICATIONS

8. Drawer Locks:
 - a. National #C8149
 - b. Approved equal.
 9. Sliding Door Locks:
 - a. National #C8179
 - b. Approved equal.
 10. Sliding Door Assembly:
 - a. Hettich #6065 Overhead Assembly
 - b. Approved equal.
 11. Glass Door Assembly:
 - a. Knape & Vogt #1092 Assembly
 - b. Approved equal.
 12. Adjustable Shelving - Recessed Pilaster Standards:
 - a. Knape & Vogt #83 with KV183C steel brackets every 6" vertical o.c..
 - b. Approved equal.
 13. File Drawer:
 - a. Custom aluminum bar rails set up for both directions with slots for both 8½" x 11" and 8½" x 14" hanging file folders.
 14. Lateral File Drawer:
 - a. Custom aluminum bar rails with intermediate supports and slots for both 8½" x 11" and 8½" x 14" hanging file folders.
 15. Door Catches:
 - a. Epcos #1007 Magnetic Catch
 - b. Approved equal.
- D. Cabinet Liner:
1. 45# density particle board with melamine liner.
 2. Color: As selected by the Architect from the manufacturer's "complete" range of colors. The Architect shall not be limited in his selection to the "standard" range of colors.

TECHNICAL SPECIFICATIONS

2.02 OTHER MATERIALS

- A. All other materials, not specifically described but required for a complete and proper installation, shall be as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 FABRICATION

- A. Fabricate all plastic faced cabinet work to meet W.I. custom grade specifications, as modified in this Specification, the Drawings, and the manufacturer's recommendations and approved shop drawings.
- B. Laminate all exposed surfaces of the door faces, drawer fronts, finished ends, interior surfaces of open units, edges for case body and drawer sides, tops, back and bottom of reveal surfaces with 1/16" plastic laminate.
- C. Semi exposed surfaces shall be melamine on 3/4" industrial grade particle board.
- D. Case Ends: Melamine on 3/4" industrial grade particle board with 1/16" laminate plastic front edge. Ends to be rabbetted to receive top and bottom, grooved to receive back. Secure ends to top and bottom with glue and screws.
- E. Case Top and Bottom: Melamine on 3/4" industrial grade particle board with 1/16" laminate plastic front edge. Secure to ends with glue and screws.
- F. Case Back: Melamine on 3/4" industrial grade particle board. Secure to ends, top and bottom with glue and screws.
- G. Adjustable Shelves: Melamine on 3/4" industrial grade particle board of shelves 36" wide or less (top, bottom and all edges). Use 1" industrial grade particle board at shelves wider than 36". Each shelf to have (4) supports.
- H. Hinged Doors: Melamine on 3/4" industrial grade particle board (inside); 1/16" laminate plastic (outside), four (4) edges, 3mm PVC to match laminate. Each door to have one (1) pair institutional type hinges, one (1) pull.
- I. Drawer Fronts: Melamine on 3/4" industrial grade particle board (inside); 1/16" laminate plastic (outside), four (4) edges, 33mm PVC to match laminate. Each front to have one (1) pull. Secure to drawer box with screws.
- J. Counter Tops: 3/4" industrial grade particle board with 1/16" laminate plastic surface with backer sheet (color to match laminated plastic). Provide double thickness or 1-1/2" industrial grade particle board for unsupported top spans over 48". All outside corners shall be rounded (1-1/2" radius).

TECHNICAL SPECIFICATIONS

3.02 INSPECTION

- A. Examine the areas and conditions under which work of this Section will be installed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.03 INSTALLATION

- A. Install all components in strict accordance with the original design and the approved Shop Drawings, anchoring all items firmly into position for long life under hard use. Adjust cabinets and hardware so that doors and drawers operate smoothly. Lubricate hardware as recommended by manufacturer. Install cabinets level and with fitting tolerances approved by the Architect.
- B. Caulk all joints where the cabinet terminates at the wall.

3.04 PROTECTION AND CLEANING

- A. Upon completion of the installation, visually inspect each installed item, thoroughly clean all surfaces by using the cleaning material recommended by the manufacturer of the finish being cleaned, and carefully adjust all operating components for optimum operation.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 06600 PVC WALL PANELING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide exterior-grade PVC Wall Panels where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.
- C. Related Work:
 - 1. Section 07900: Sealants and Caulking

1.02 QUALITY ASSURANCE

- A. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.03 REFERENCES

- A. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.

1.04 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.
- B. Product Data: Manufacturer's data sheets, including the following:
 - 1. Panel and trim details.
 - 2. Installation instructions.
- C. Samples:
 - 1. Submit manufacturer's samples of wall panels, including tongue-and-groove edges and nailing fins.
 - 2. Submit manufacturer's samples of each type of trim to be installed.
- D. Shop Drawings:
 - 1. Submit shop drawings for PVC Wall Panels, showing location of each item, dimensioned plans and elevations, large scale details, anchors and other components.

TECHNICAL SPECIFICATIONS

- E. Manufacturer's Certification: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.
- F. Maintenance Instructions: Submit manufacturer's maintenance and cleaning instructions.
- G. Warranty: Submit manufacturer's standard warranty.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage:
 - 1. Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
 - 2. Store wall panels flat.
- C. Handling: Protect materials during handling and installation to prevent damage.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Installing Wall Panels:
 - 1. Cold Temperatures: When installing wall panels in temperatures below 40 degrees F., warm to a minimum of 60 degrees F. overnight and leave space between panels to allow for expansion in accordance with manufacturer's instructions.
 - 2. Warm Temperatures: When installing wall panels in temperatures above 70 degrees F., warm panels to a minimum of 60 degrees F. in accordance with manufacturer's instructions.
- B. Cutting Wall Panels:
 - 1. Cold Temperatures: Before field-cutting wall panels in temperatures below 40 degrees F., warm panels to a minimum of 60 degrees F. overnight.

1.07 WARRANTY

- A. Warranty Period for Wall Panels: 10 years.

PART 2 - PRODUCTS

2.01 PVC WALL PANELING

- A. Acceptable Manufacturers:
 - 1. Extrutech Plastics, Inc., 5902 West Custer Street, Manitowoc, Wisconsin 54220, (888) 818-0118, Fax (920) 684-4344, Email info@epiplastics.com; website: epiplastics.com.
 - 2. Approved equal.

TECHNICAL SPECIFICATIONS

2.02 MATERIALS

A. Wall Panels: "P2400"

1. Description: Tongue-and-groove, rib-reinforced wall panels with nailing fins.
2. Material: 100 percent virgin, exterior-grade PVC.
3. Outside Surface: Flat
4. Width: 24 inches
5. Thickness: 1/2 inch
6. Weight: 0.69 pound per square foot
7. Surface Burning Characteristics: ASTM E 84:
 - a. Flame Spread Index: 15
 - b. Smoke Developed Index: 350
8. Color: White, glossy finish.
9. Nonporous
10. Waterproof
11. Corrosion proof
12. Acceptance:
 - a. USDA
 - b. Canadian Food Inspection Agency (CFIA)

B. Trim:

1. Material: 100 percent virgin, exterior-grade PVC.
2. Weight: 0.06 pound per linear foot.
 - a. Color: Same as wall panels.

2.03 ACCESSORIES

A. Construction Adhesive: PL400 or Liquid Nails, as recommended by wall panel manufacturer.

B. Fasteners:

1. Fastening into Wood: Stainless steel, 1-1/4 inch, No. 8 truss-head sheet metal screws.
2. Fastening into Masonry: Stainless steel, Buildex Tapcon 3/16 inch by 1-1/4 inch screws, with 1/4 inch stainless steel washers.

TECHNICAL SPECIFICATIONS

3. Fastening into Metal: Stainless steel, 3/4 inch, No. 8 truss-head sheet metal or flat-head Tek screws.
4. Staples: Do not use.

2.04 OTHER MATERIALS

- A. All other materials, not specifically described but required for a complete and proper installation, shall be as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas to receive wall panels.
- B. Notify Architect of conditions that would adversely affect installation or subsequent use.
- C. Do not begin preparation or installation until unacceptable conditions are corrected.

3.02 PREPARATION

- A. Ensure wall panels are dry and clean.

3.03 INSTALLATION

- A. Install wall panels in accordance with manufacturer's instructions at locations indicated on the Drawings.
- B. Install wall panels plumb, level, square, flat, and in proper alignment.
- C. Install trim in accordance with manufacturer's instructions.
- D. Anchor wall panels with construction adhesive and fasteners in accordance with manufacturer's instructions.
- E. Fasteners:
 1. Install fasteners 16 inches to 24 inches on center into nailing fins.
 2. Keep top of screw head 1/16 inch above top of nailing fins, allowing panels to move slightly.
 3. Do not recess screw heads into nailing fins.
 4. Ensure nailing fins lay flat against surface, not deformed around screw heads.
 5. Ensure fasteners are not exposed.
- F. Cutting Wall Panels:
 1. Field-cut panels as necessary in accordance with manufacturer's instructions.

TECHNICAL SPECIFICATIONS

2. Ensure cuts are straight, square, and do not damage panels.

G. Apply joint sealants as specified in Section 07900, Sealants and Caulking.

3.04 ADJUSTING

A. Repair minor damage to finish in accordance with manufacturer's instructions and as approved by the Architect.

B. Remove and replace damaged wall panels in accordance with manufacturer's instructions.

C. Apply joint sealants as specified in Section 07900, Sealants and Caulking.

3.05 CLEANING

A. Clean wall panels promptly after installation in accordance with manufacturer's instructions.

B. Do not use harsh cleaning materials or methods that could damage finish.

3.06 PROTECTION

A. Protect installed wall panels from damage during construction until completion of project.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 07100 WATERPROOFING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide all labor, materials, tools and equipment; and perform all waterproofing as shown on Drawings, specified herein, and required for complete and proper installation.
- B. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.
- C. Related Work:
 - 1. Section 03300: Cast-in-Place Concrete

1.02 QUALITY ASSURANCE

- A. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.03 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.
- B. Manufacturer's Data:
 - 1. Complete materials list of all items proposed to be furnished and installed under this Section.
 - 2. Manufacturer's specifications and other data required to demonstrate compliance with the specified requirements.
 - 3. Manufacturer's recommended installation procedures. Submit a copy to the applicator.

1.04 REFERENCE STANDARDS

- A. The National Roofing Contractors Association: NRCA Roofing & Waterproofing Manual, Third Edition.

1.05 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect installed work and materials of all other trades.

TECHNICAL SPECIFICATIONS

- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.

1.06 DELIVERY AND STORAGE

- A. Deliver all materials to the job site in their original unopened containers with all labels intact and legible at time of use.
- B. Store in strict accordance with the manufacturer's recommendations.

PART 2 - PRODUCTS

2.01 MEMBRANE WATERPROOFING

- A. Acceptable Manufacturers:
 - 1. W.R. Grace & Co.
 - 2. Approved equal.
- B. Provide Bituthene System 4000 by W.R. Grace & Co., self-adhesive; cold applied composite sheet consisting of a thickness of 56 mils of rubberized asphalt and 4 mils of cross-laminated, high density, polyethylene film specially formulated for use with water based surface conditioner. Provide rubberized asphalt membrane covered with release paper which is removed during installation.
- C. Protection Board: Bituthene Asphaltic Hardboard, premolded semi-rigid protection board consisting of bitumen, mineral core and reinforcement.
- D. Prefabricated Drainage Composite: Drainage Composite shall be designed to promote positive drainage while serving as a protection course.
- E. Miscellaneous Materials: Surface Conditioner, mastic, liquid membrane, tape and accessories as recommended by the manufacturer.
- F. Provide at all wall/footing surfaces where finish floor is below grade.

2.02 OTHER MATERIALS

- A. All other materials, not specifically described but required for a complete and proper installation shall be as selected by the Contractor and subject to the Architect's approval.

PART 3 - EXECUTION

3.01 INSPECTION

- A. The Installer shall examine conditions of substrates and other conditions under which this work is to be performed and notify Contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected.

TECHNICAL SPECIFICATIONS

3.02 PREPARATION OF SUBSTRATES

- A. Refer to manufacturer's recommendations for requirements for preparation of substrates. Surfaces shall be structurally sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove contaminants such as grease, oil, and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Use repair materials and methods which are acceptable to manufacturer of sheet membrane waterproofing.
- B. Masonry Substrates: Apply waterproofing over concrete block with smooth trowel-cut mortar joints or parge coat.
- C. Related Materials: Treat joints and install flashings as recommended by waterproofing manufacturer.

3.03 INSTALLATION

- A. Refer to manufacturer's literature for recommendations on installation, including but not limited to, the following.
 - 1. Apply surface conditioner at dilution and rate recommended by manufacturer. Recoat areas not waterproofed if contaminated by dust. Mask and protect adjoining exposed finish surfaces to protect those surfaces from excessive application of surface conditioner.
 - 2. Delay application of membrane until surface conditioner is completely dry. Dry time will vary with weather conditions.
 - 3. Seal daily terminations with troweled bead of mastic.
 - 4. Apply protection board and related materials in accordance with manufacturer's recommendations.

3.04 CLEANING AND PROTECTION

- A. Remove any masking materials after installation. Clean any stains on materials which would be exposed in the completed work.
- B. Protect completed membrane waterproofing from subsequent construction activities as recommended by manufacturer.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 07210 BUILDING INSULATION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide all building insulation required for this work including, but not necessarily limited to exterior walls, roofs and sound walls.
- B. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.

1.02 QUALITY ASSURANCE

- A. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.03 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.
- B. Manufacturer's Data:
 - 1. Complete materials list of all items proposed to be furnished and installed under this section.
 - 2. Sufficient data to demonstrate compliance with the specified requirements.

1.04 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this section before, during, and after installation and to protect the work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.

1.05 DELIVERY AND STORAGE

- A. Deliver materials to the job site, and store in a safe dry place with all labels intact and legible at time of installation.

TECHNICAL SPECIFICATIONS

PART 2 - PRODUCTS

2.01 RIGID INSULATION - PERIMETER INSULATION

A. Acceptable Manufacturers:

1. Dow Chemical "Styrofoam"
2. Amoco "Amofoam" CM
3. Approved equal

B. Rigid insulation shall be 2" thick; density 2.0 lbs./cu. ft.; compressive strength 40 PSI; water vapor permeability 0.6 perm-inch; water absorption 1% by volume; thermal conductivity "K" 0.11.

C. Mastic as recommended by insulation manufacturer.

D. Provide at all exterior foundation stem walls.

2.02 MINERAL FIBER BLANKET INSULATION

A. Acceptable Manufacturers:

1. Johns Manville
2. U.S. Gypsum
3. Certainteed
4. Owens Corning Fiberglass
5. Approved equal.

B. Glass or other inorganic fibers and resinous binders formed into flexible blankets or semi-rigid sheets, complying with ASTM C 665, Type III; thermal conductivity (K-value at 75 degrees F.) of 0.27; manufacturer's standard sizes.

1. Flame Rated FSK Foil Faced Blanket: Reflective aluminum foil vapor barrier laminated to one face, with 1" flanges or long edges; vapor transmission not more than 0.5 perms. Flame spread, smoke contributed, and fuel contribution per ASTM E84 of less than 25. Comply with ASTM C665, Type III, Class A.
2. Un-faced, Self-Supporting Blanket: Semi-rigid blanket or sheet, as required for units to be self-supporting when cut slightly over-sized, and placed in space to be insulated. Comply with ASTM C665, Type I. Use with 4 mil polyethylene vapor barrier.
3. Foil Faced Blanket: For concealed applications. Comply with ASTM C665, Type III, Class B.

TECHNICAL SPECIFICATIONS

2.03 SOUND BATTS

- A. Acceptable Manufacturers:
 - 1. Johns Manville.
 - 2. Approved equal.
- B. Sound Batts shall be fiberglass un-faced batts 3-1/2" thick at walls and 24" x 48" poly encapsulated fiberglass batts 6-1/2" thick at ceilings. Flame spread per ASTM E84. Comply with ASTM C665, Type II; 25/50 or less.

2.04 OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which work of this Section will be installed. Correct conditions detrimental to proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Comply with manufacturer's instructions for the particular conditions of installation in each case. If printed instructions are not available or do not apply to the project conditions, consult the manufacturer's technical representative for specific recommendations before proceeding with the work.
- B. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections which interfere with placement.

3.03 PERIMETER INSULATION

- A. On vertical surfaces, set units in adhesive applied in accordance with manufacturer's instructions. Use type of adhesive recommended by manufacturer.
- B. Protect insulation on vertical surfaces (from damage during back-filling) by application of one of the types of protection course materials recommended by the insulation manufacturer. Set in adhesive in accordance with the recommendations of the manufacturer of the insulation.

3.04 GENERAL BUILDING INSULATION

- A. Apply insulation units to the substrate by the method indicated, complying with the manufacturer's recommendations. If no specific method is indicated, bond units to the

TECHNICAL SPECIFICATIONS

substrate with adhesive or use mechanical anchorage, to provide permanent placement and support of units.

- B. Set vapor barrier faced units with vapor barrier to inside of construction, except as otherwise shown. Do not obstruct ventilation spaces.
- C. Tape ruptures and staple and tape joints in vapor barriers, using adhesive tape of type recommended by insulation manufacturer, and seal each continuous area of insulation to surrounding construction so as to ensure vapor-tight installation of the units.
- D. Set reflective foil-faced units accurately with air space in front of foil as shown. Provide not less than 0.75" wide air space wherever possible. Use fire rated foil faced insulation where insulation will not be covered by gypsum board or will be otherwise exposed to any airspace larger than 0.75".
- E. Set friction fit fiber batts into stud spaces making sure entire area from stud to stud and around all piping is filled. Install 4 mil vapor barrier over faces of studs, taping all joints and around all projections (electrical boxes, piping, etc.) prior to installation of drywall materials.
- F. Verify with mechanical and electrical contractors that the installation of insulation has allowed for proper clearances and ventilation in order to avoid potential fire hazards.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 07221 METAL BUILDING ROOF/WALL INSULATION SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide interior liner fabric of the color specified, support strapping of the appropriate color, fasteners of the appropriate type and color, sealants, thermal break materials and thermal insulation of the appropriate type to insulate the roof/wall areas to the full designed R-value of the building as specified.
- B. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.
- C. Related Work:
 - 1. Section 07600: Flashing and Sheet Metal
 - 2. Section 07610: Preformed Metal Roof Panels
 - 3. Section 13341: Metal Building Systems

1.02 QUALITY ASSURANCE

- A. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Use components produced by manufacturers regularly engaged in the business of manufacturing and installing Roof/Wall Insulation and approved for use with the Roofing System.
- C. At least one person shall be present at all times during execution of this portion of the Work, who shall be thoroughly familiar with the materials specified and the proper methods for their installation, and who shall personally direct all work of this Section.

1.03 REFERENCE STANDARDS

- 1. Underwriters Laboratories, Inc. (U.L.) "Fire Resistance Directory."
- 2. Underwriters Laboratories, Inc. (U.L.) "Building Materials Directory".
- 3. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) "Handbook of Fundamentals".
- 4. American Society of Testing Materials (ASTM):

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5. Federal Specification (FS): HH-I-588B Fiberglass Blanket Insulation.
6. Factory Mutual (FM).

1.04 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.
- B. Manufacturer's Data:
 1. Materials list of items proposed to be provided under this Section.
 2. Manufacturers' specifications and other data needed to prove compliance with the specified requirements.
 3. Manufacturers' recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.
- C. Shop Drawings:
 1. Roof Insulation System: Specific drawings for the project showing purlin spacings, support strap spacings, liner fabric sizes and locations; insulation thicknesses, sizes and locations; installation instructions.

1.05 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect materials of this Section before, during and after installation and to protect installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.
- C. Roof insulation that has been wet, but which has dried, may not be used.

1.06 DELIVERY AND STORAGE

- A. Deliver all materials to the job site in their original unopened containers with all labels intact and legible at time of use. Store in strict accordance with the manufacturers' recommendations.
- B. When stored outdoors, stack insulation on pallets or dunnage at least 4 inches above ground level and cover with tarpaulins or other suitable covering.

1.07 WARRANTY

- A. Provide the warranty in conjunction with the Roofing System specified in Section 13120.

TECHNICAL SPECIFICATIONS

PART 2 - PRODUCTS

2.01 ROOF INSULATION SYSTEM

A. Acceptable Manufacturers

1. Thermal Design, Inc.
2. Approved equal.

B. Acceptable systems shall be the Simple Saver insulation system manufactured by Thermal Design, Inc., with an insulation R-value of 38 and an installed thickness of 12". Roof system shall be a double layer system. A thermal break shall be applied or a thermal block shall be applied where there is no existing thermal break. The thermal break shall be 1/8" x 3" foam tape. System components shall meet the following minimum specifications.

C. Steel Strap: 80 SKI tempered, high-strength steel, galvanized, primed and painted the specific color on the exposed side. Minimum size shall be .015 x 3/4" x continuous length. The strap color shall be white.

D. Fasteners: #12 x 1-1/4" plated Tek 4 screws painted to match the specified color.

E. Simple Saver Liner Fabric: Shall be woven reinforced high-density polyethylene yarns coated on both sides with a continuous white polyethylene film.

1. The fabric grade for the ceiling shall be Simple Saver Plus White.
2. The fabric shall have a flame spread index of 25 or less and smoke density index of 50 or less based on ASTM E-84 test standards.
3. This material shall be manufactured in large custom pieces by extrusion welding from roll goods.
4. Fabric shall be folded to allow for rapid pullout on the strap support system.
5. Colors for ceiling fabric shall be white.
6. Liner fabric perm rating shall be .025 grains/hr. sq. ft. (based on ASTM E-96, procedure B, "non-inverted water method"). Liner fabric shall not function as a vapor barrier and shall be perforated with 3/16 minimum holes spaced not more than 4 inches apart in each direction.

F. Sealants: Shall be extruded fast-track solvent-based vapor barrier sealant, synthetic rubber adhesive for sealing vapor barrier laps and/or pressure sensitive 3/4" wide by 1/32" thick extruded vapor barrier sealant by Thermal Design, Inc..

G. Insulation: Shall be fiberglass blanket or batt insulation meeting Federal Specifications HH-1-588B, Form B, Type 1 or other insulation form as may be recommended and submitted by the system manufacturer and approved by the Architect during submittals.

TECHNICAL SPECIFICATIONS

- H. Insulation Hangers: Shall be FAST-R hangers for supporting insulation between wall girts and roof purlins if roof pitch is over 4:12.
- I. Thermal Break: Thermal break shall be 1/8" x 3" wide white, closed cell polyethylene foam with pre-applied adhesive film and peel-off backing .

2.02 OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 GENERAL

- A. Simple Saver Roof/Wall Systems: Cut to length and install painted steel straps in the pattern and spacings as shown on the project shop drawings: The straps are installed in tension and span immediately below the bottom plane of the purlins. Position the pre-folded vapor barrier fabric on the strap platform along one eave purlin. Clamp the two bottom corners at the eave and also centered on the bay. Pull the other end of the pleat folded fabric across the building width on the strap platform but below the purlins, pausing only at the ridge to fasten the straps and fabric in position where the plane of the roof changes and to release temporary fasteners on the opposite ridge purlin. Once positioned, the fasteners are installed from the bottom side at each strap-purlin intersection and the edges are trimmed and sealed along the rafters.
- B. Insulation is unpacked and placed on the vapor liner system being sure to shake to a thickness exceeding the specified thickness. The second layer of insulation is placed over the perpendicular to the purlins as the roof sheeting is applied. It is important the insulation cavity be filled or the cavities be ventilated to minimize the probability of condensation.

3.02 JOB CONDITIONS

- A. Do not install materials in rain, cold, moisture, frost, snow or other climatic conditions which would incorporate moisture into the roof materials and prevent proper application.

3.03 INSPECTION

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Apply materials over smooth, dry surfaces that are free from dirt, debris and other coatings that prevent adhesion of materials to be applied.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 07600 FLASHING AND SHEET METAL

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide all Flashing and Sheet Metal not specifically described in other Sections of these Specifications but required to prevent penetration of water through exterior shell of the building.
- B. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.
- C. Related Work:
 - 1. Section 07800: Roof Accessories
 - 2. Section 07900: Sealants and Caulking

1.02 QUALITY ASSURANCE

- A. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.03 REFERENCE STANDARDS

- A. "Architectural Sheet Metal Manual" current edition of the Sheet Metal and Air Conditioning, Contractors National Association.
- B. National Roofing Contractors Association: NRCA Roofing & Waterproofing Manual, Fifth Edition.
- C. American Society for Testing Materials - ASTM B32.

1.04 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.
- B. Manufacturer's Data:
 - 1. Complete materials list of all items proposed to be furnished and installed under this Section.
 - 2. Manufacturer's specifications and other data required to demonstrate compliance with the specified requirements.

TECHNICAL SPECIFICATIONS

C. Shop Drawings:

1. Shop Drawings showing all proposed work of this Section.

1.05 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Standard commercial items may be used for flashing, trim, and reglets, provided all such items meet or exceed the quality standards specified herein.
- B. Quality standards: In addition to complying with all pertinent codes and regulations, comply with all pertinent recommendations contained in "Architectural Sheet Metal Manual" current edition of the Sheet Metal and Air Conditioning Contractors National Association.

2.02 MATERIALS AND GAUGES

- A. Where sheet metal is required, and no material or gauge is indicated on the Drawings, provide the highest quality and gauge commensurate with the referenced standards.

2.03 GALVANIZED IRON

- A. Sheet metal or iron shall be standard brand of open hearth copper-bearing steel, copper-molybdenum iron, or pure iron sheets.
- B. Zinc Coating:
 1. All galvanized sheets shall have a zinc coating applied by hot-dip process to all surfaces.
 2. Zinc coating shall weigh not less than 381 grams per sq. m (1-1/2 oz. per sq. ft.) of surfaces covered and shall conform with ASTM A 93.

2.04 NAILS, RIVETS, AND FASTENERS

- A. Use only soft iron rivets having rust-resistive coating, galvanized nails, and cadmium plated screws and washers in connection with galvanized iron and steel.

2.05 FLUX

- A. All flux used for galvanized iron or steel shall be raw muriatic acid.

TECHNICAL SPECIFICATIONS

2.06 SOLDER

- A. All solder used on galvanized sheet steel shall conform to ASTM B 32.

2.07 REGLETS

- A. Acceptable Manufacturers:

1. Fry Reglet, Corp.
2. Approved Equal.

2.08 OTHER MATERIALS

- A. All other materials, not specifically described but required for a complete and proper installation shall be as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which work of this section will be installed. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 EMBEDMENT

- A. Embed all metal in connection with roofs in a solid bed of sealant using materials and methods described in Section 07900: Sealants and Caulking of these specifications or other materials and methods approved in advance by the Architect.

3.03 INSTALLATION

- A. Installation shall be in conformance with the recommendations of the NRCA Roofing & Waterproofing Manual, Fifth Edition.
- B. Form all sheet metal accurately and to the dimensions and shapes required, finishing all molded and broken surfaces with true, sharp, and straight lines and angles. Where intercepting other members, cope to an accurate fit and solder securely.
- C. Unless otherwise called for, turn all exposed edges back 13 mm ($\frac{1}{2}$ ").
- D. Expansion: Form, fabricated, and install all sheet metal so as to adequately provide for expansion and contraction in the finished work.
- E. Weatherproofing:
 1. Finish watertight and weathertight where so required.

TECHNICAL SPECIFICATIONS

2. Make all lock seam work flat and true to line, sweating full of solder.
3. Make all lock seams and lap seams, when soldered, at least 13 mm (1/2") wide.
4. Where lap seams are not soldered, lap according to pitch but in no case less than 75 mm (3").
5. Make all flat and lap seams in direction of flow.

F. Joints:

1. Join parts with rivets or sheet metal screws where necessary for strength or stiffness.
2. Provide suitable watertight expansion joints for all runs of more than 12.4 m (40'), except where closer spacing is indicated on the drawings or required for proper installation.

G. Nailing:

1. Whenever possible, secure metal by means of clips or cleats without nailing through the metal.
2. In general, space all nails, rivets, and screws not more than 20 cm (8") apart and, where exposed to the weather, use lead washers.
3. For nailing into wood, use barbed roofing nails 32 mm (1-1/4") long by 11 gauge.
4. For nailing into concrete, use drilled plugholes and plugs.

H. Caulk, seal and fasten so as to provide a complete weathertight installation.

3.04 SOLDERING

- A. Thoroughly clean and tin all joint material prior to soldering.
- B. Perform all soldering slowly with a well heated copper in order to heat the seams thoroughly and to completely fill them with solder.
- C. Perform all soldering with a heavy soldering copper of blunt design, properly tinned for use.
- D. Make all exposed soldering on finished surfaces neat, full flowing, and smooth.
- E. Cleaning: After soldering, thoroughly wash acid flux with a soda solution.

3.05 CLEANING AND PROTECTION

- A. Remove trash, debris and miscellaneous scraps generated from this work from the surrounding areas.

TECHNICAL SPECIFICATIONS

3.06 TESTING

- A. Upon request of the Architect, demonstrate by hose or standing water that all flashing and sheet metal is completely watertight.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 07900
SEALANTS AND CAULKING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide Sealants and Caulking where shown on the Drawings, as specified herein, and as needed for a complete and proper installation, including:
 - 1. Sealing of all joints as required to provide a positive barrier against passage of air and passage of moisture.
 - 2. Glazing sealants.
 - 3. Fire stopping at through-penetrations.
- B. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.
- C. Related Work:
 - 1. Section 07600: Flashing and Sheet Metal
 - 2. Section 07800: Roof Accessories
 - 3. Section 08100: Metal Doors and Frames
 - 4. Section 08125: Aluminum Windows
 - 5. Section 08800: Glass and Glazing

1.02 QUALITY ASSURANCE

- A. Qualifications of Installers: For caulking and installation of sealants throughout the work, use only personnel who have been specifically trained in such procedures and who are completely familiar with the joint details shown on the drawings and the installation requirements called for in this Section.
- B. Qualification of Fire Resistant Firestop and Fire Safing Materials:
 - 1. Fire resistant firestop materials shall be fire tested and rated in accordance with ASTM E 119 and E814, including hose stream test. Fire tests shall be conducted at a minimum 0.03 inches Water Positive Pressure. All materials shall have a Fire rating equal to the surrounding assembly.
 - 2. Fire resistant firestop materials shall meet the requirements of 2006 IBC and NFPA 70 - National Electric Code.

TECHNICAL SPECIFICATIONS

3. All materials used shall be manufactured, supplied or approved by the manufacturer.
4. All materials used shall be installed by one approved installer.
5. Installer shall be approved by the manufacturer to install the specified systems.
6. All materials shall be installed in accordance with the manufacturer's current written specifications and details. Deviations shall not be made without prior written approval from the manufacturer.
7. At least one person shall be present at all times during execution of this portion of the work, who shall be thoroughly familiar with the materials specified and the proper methods for their installation, and who shall personally direct all work of this Section.

1.03 REFERENCE STANDARDS

A. Federal Specifications (FS)

1. FS: TT-S-00230C: Single Component Sealants.
2. FS: TT-S-00227E: Multi Component Sealants.

B. American Society for Testing Materials (ASTM)

1. ASTM C834-76: Latex Sealing Compounds.
2. ASTM C920-79: Elastomeric Joint Sealants.
3. ASTM E814: Fire Tests of Through Penetration Firestops.

C. Underwriter's Laboratories

1. UL 1479: Fire Tests of Through Penetration Firestops.

D. National Fire Protection Code

1. NFPA 70: National Electric Code.
2. 2012 IBC.

1.04 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.
- B. Manufacturer's Data:
 1. A complete materials list showing all items proposed to be furnished and the application under which it will be installed.

TECHNICAL SPECIFICATIONS

2. Sufficient data to demonstrate that all such materials meet or exceed the specified requirements.
3. Specifications, installation instructions, and general recommendations from the materials manufacturers showing procedures under which it is proposed that the materials will be installed.

C. Samples:

1. Joint Sample: Prior to Sealants and Caulking work, provide a sample of each type of finished joint as directed by the Architect.
 - a. The sample shall show the workmanship, bond and color of sealant.
 - b. The quality of the work throughout the job shall match the approved sample.
2. Accompanying the manufacturers data submit one (1) sample of each sealant, each backing material, each primer, and each bond breaker proposed to be used.

1.05 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the owner.

1.06 DELIVERY AND STORAGE

- A. Deliver all materials of this Section to the job site in the original unopened containers with all labels intact and legible at time of use. Store only under conditions recommended by the manufacturers.
- B. Do not retain on the job site any material which has exceeded the shelf life recommended by its manufacturer.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Definitions: The terms "sealant" and "caulk" as used herein and as shown on the Drawings shall be interchangeable, and shall mean all sealing and caulking materials including elastomeric sealants, non-elastomeric sealants, acrylic sealants, mastic, adhesives, foam, firestop, primers, and back up materials required.
- B. Contractor shall provide the proper sealant, primer, backer rod, bond breakers and other accessories required for each different substrate and application as recommended by the manufacturer for the installation.

TECHNICAL SPECIFICATIONS

- C. Compatibility: Before purchase of each required material, confirm its compatibility with each other material it will be exposed to in the joint system.
- D. Size and Shape: As shown or, if not shown, as recommended by the manufacturer for the type and condition of joint, and for the indicated joint performance or movement.
- E. Grade of Sealant: For each application, provide the grade of sealant (non-sag or self-leveling) as recommended by the manufacturer for the particular condition of installation (location, joint shape, ambient temperature, and similar conditions), to achieve the best possible overall performance. Grades specified herein are for normal condition of installation.
- F. Colors: For exposed materials provide color to match the adjacent surface or as selected by Architect from manufacturer's standard colors.
 - 1. For concealed materials, provide the natural color which has the best overall performance characteristics.

2.02 ELASTOMERIC SEALANTS

- A. Acceptable Manufacturers:
 - 1. Tremco
 - 2. Sika
 - 3. General Electric
 - 4. Dow Corning
 - 5. Approved equal
- B. Provide an elastomeric, cold-applied, polyurethane or silicone sealant for applications as recommended by the manufacturer.
- C. Exterior and Interior Vertical Surfaces:
 - 1. Usage: Seal building joints, caulk at porous substrates, weatherproof junctions of building materials, and at joints to provide a positive barrier against passage of air and passage of moisture.
 - 2. Two-Component, premium-grade, polyurethane-base, non-sag, elastomeric sealant complying with FS TT-S-00227E and ASTM C-920.
- D. Interior and Exterior Horizontal Surfaces:
 - 1. Usage: Expansion Control Joints in parking decks, pavements and driveways.
 - 2. Two-Component, premium-grade, polyurethane-base, self-leveling, elastomeric sealant complying with FS TT-S-00227E and ASTM C-920.

TECHNICAL SPECIFICATIONS

E. Glazing Sealant:

1. Usage: Glazing windows, curtain walls and skylights.
2. One-Component, silicone sealant, complying with FS TT-S-001543A and ASTM C-920.

F. Interior Seams and Cracks:

1. Usage: Interior joints, seams and cracks where no passage of air or moisture is possible.
2. One-Component, acrylic/latex, non-sag, acrylic polymer base sealant complying with FS-TT-S-00230C Class B, Type II and ASTM C-920, Type S, Grade NS, Class 12-1/2.

G. Wet Areas:

1. Usage: Non-porous surfaces around ceramic tile, showers, tubs, sinks and plumbing fixtures.
2. One-Component, fungicidal mildew resistant, silicone rubber sealant complying with FS-TT-S-00230, FS-TT-S-001543 and ASTM C-920.

2.03 NON-ELASTOMERIC SEALANTS

A. Acceptable Manufacturers:

1. Sika
2. Approved equal

B. Provide a flexible sealer/adhesive for the application as recommended by the manufacturer.

C. Saw-Cut Joints:

1. Usage: Non-moving saw-cut construction and control joints.
2. Two-Component, solvent-free, moisture insensitive, flexible, non-sag, self leveling epoxy resin material.

2.04 FIRESTOPPING COMPOUND

A. Acceptable Manufacturers:

1. Spec Seal
2. Approved equal, complying with U.L. listing.

B. Provide "F" or "T" rated firestop as required; One-Component, intumescent, thixotropic (free of asbestos, halogens and volatile solvents) fire stopping compound complying with ASTM E814 and UL 1479 for the fire rating required.

TECHNICAL SPECIFICATIONS

- C. Firestop materials shall be paintable or capable of receiving finish materials in those areas which are exposed to view and which are scheduled to receive finishes.

2.05 PRIMERS

- A. Provide Primers where required by the manufacturer which are nonstaining, have been tested for durability on the surfaces to be sealed, and are specifically recommended for the installation by the manufacturer of the sealant used.

2.06 PREFORMED COMPRESSIBLE FOAM SEALANTS

- A. Butylene Impregnated Foam Sealant: Preformed sealant strips of non- drying butylene compound saturating an open-cell flexible, compressible foam of polyurethane or other durable weather-resistant and permanently elastic material; formulated to provide a watertight joint with adhesive bond to joint surfaces when compressed in the joint to 50% of normal strip dimensions; non-staining and non- migrating; paintable.

2.07 BOND-PREVENTIVE MATERIALS

- A. General: Use only those backup materials which are specifically recommended for this installation by the manufacturer of the sealant used, and which are nonabsorbent and nonstaining.
- B. Backer-Rod: Closed-cell polyethylene foam backer-rod as a stopper or other material as recommended by the manufacturer.
- C. Polyethylene Tape: Pressure-sensitive adhesive, with the adhesive required only to hold tape to the construction materials as indicated.

2.08 OTHER MATERIALS

- A. All other materials, not specifically described but required for complete and proper installation, shall be as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 JOB CONDITIONS

- A. Do not apply sealants and caulking when the ambient temperature is below 40°F.
- B. Only apply sealant to clean, sound, dry, and frost-free substrates.

3.02 INSPECTION

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

TECHNICAL SPECIFICATIONS

3.03 INSTALLATION - SEALANTS

A. General:

1. Manufacturer's Instructions: Comply with manufacturer's printed instructions except where more stringent requirements are shown or specified, and except where manufacturer's technical representative directs otherwise.
2. Set joint filler units at proper depth or position in the joint to coordinate with other work, including the installation of bond breakers, backer rods and sealants. Do not leave voids or gaps between the ends of joint filler units.
3. Install bond breaker tape wherever shown and wherever required by manufacturer's recommendations to ensure that elastomeric sealants will perform properly.
4. Employ only proven installation techniques, which will ensure that sealants will be deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of the joint bond surfaces equally on opposite sides.
5. Spillage: Do not allow sealants or compounds to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces. Clean the adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage.
6. Cure and Protection: Cure sealants and caulking compounds in compliance with manufacturer's instructions and recommendations to obtain high early bond strength, internal cohesive strength and surface durability.

B. Preparation:

1. Clean all surfaces. Joint walls must be sound, clean, dry, frost-free, and free of oil and grease. Curing compound residues and any other foreign matters must be thoroughly removed.
2. Porous substrates and precast concrete panels using form release agents other than polyethylene film should be cleaned by grinding, saw cutting, blast cleaning (sand or water), mechanical abrading or a combination of these methods which will provide a sound, clean and dry surface for sealant application.
3. Cleaning of all surfaces should be done on the same day on which the sealant is applied.
4. Provide backer rod of size and type as recommended by the manufacturer for the specific installation.
5. Install bond breaker tape or backer rod to prevent bond at base of joint.
6. Pre-condition units to approximately 70°F when recommended by the manufacturer. Move pre-conditioned units to work areas just prior to application.

TECHNICAL SPECIFICATIONS

C. Priming:

1. Prime the substrates as recommended by the manufacturer for the specific application.

D. Mixing for Two-Component Sealants:

1. Mix components per the manufacturer's recommendations.
2. Mix for 3-5 minutes to achieve a uniform color and consistency utilizing the mixing paddles or other instruments as recommended by the manufacturer. Utilize integral color as recommended.
3. Avoid entrapment of air during mixing.

E. Vertical Joints Application:

1. Apply into joints when joint slot is at mid-point of its designed expansion and contraction.
2. Place nozzle of gun into bottom of the joint filling entire joint. Keep nozzle in the sealant, and continue on with a steady flow of sealant preceding the nozzle to avoid air entrapment.
3. Avoid overlapping of sealant to eliminate entrapment of air.
4. Tool as required.
5. Do not cure in the presence of curing silicone sealants. Avoid contact with alcohol, and other solvent cleaners, during cure.
6. Maximum and minimum depth of sealant shall not exceed the manufacturers recommendations for the particular application.

F. Horizontal Joints Application:

1. When placing self-leveling grade, pour sealant into joint slot in one direction and allow sealant to flow and level out as necessary.
2. Where horizontal joints are between a horizontal surface, fill joint to form a slight cove, so that joint will not trap moisture and dirt.
3. For use in horizontal joints in traffic areas, the absolute minimum depth of the sealant is 1/2 inch and closed cell backer rod is recommended to offer greater support.
4. Roadway joints should be recessed in the joint to a minimum of 1/4 inch from the surface. Joint dimension should allow for 1/4 inch minimum and 1/2 in maximum thickness for sealant. Proper design is 2:1 width to depth ratio.

TECHNICAL SPECIFICATIONS

3.04 INSTALLATION - GLAZING SEALANTS

A. General:

1. Manufacturer's Instructions: Comply with manufacturer's printed instructions except where more stringent requirements are shown or specified, and except where manufacturer's technical representative directs otherwise.

B. Preparation:

1. Clean all joints and glazing areas by removal of foreign matter and contaminants such as oil, dust, grease, frost, water, surface dirt, old sealants or glazing compounds and any protective coating.
2. Dust, loose particles, etc., should be blown out of joints with oil-free compressed air or vacuum cleaned.
3. Metal, glass and plastic surfaces should be cleaned by a solvent procedure or by mechanical means. Soap or detergent and water cleaning treatments are not recommended.
4. Cleaning of all surfaces should be done on the same day on which the sealant is applied.

C. Application:

1. All joints should be masked to insure a neat appearance and prevent sealant applied outside the joint confines from imparting a discoloration to the substrate.
2. Sealant should be applied in a continuous operation using sufficient pressure to fill the joint and make complete contact to the joint sides.
3. Tool the sealant slightly concave using solvent or dry-tooling techniques. Do not tool with soap or detergent and water solutions.
4. Areas adjacent to joints should be masked to assure neat sealant lines.
5. Do not allow masking tape to touch the clean surfaces to which the silicone is to adhere.
6. Tooling should be complete in one continuous stroke immediately after sealant application and before a skin forms.

3.05 INSTALLATION - FIRESTOP

A. General:

1. Installation of fire stopping materials shall be in exact accordance with the manufacturer's latest published instruction, requirement, specifications, details and reviewed shop drawings.

TECHNICAL SPECIFICATIONS

B. Preparation:

1. Clean surfaces from all foreign materials i.e., loose debris, dirt, oil, grease, was and/or old caulking before sealant is applied.
2. Field measure and verify dimensions as required.
3. Protect adjacent areas or surfaces from damage as a result of the work of this Section.

C. Application:

1. Installation shall be in accordance with the appropriate UL Building Materials Directory Assembly.
2. Seal holes or voids made by penetrating items to ensure an effective fire and smoke barrier.
3. Seal all intersections and all penetrations of floors, ceilings, walls, and columns.
4. Seal around all cutouts for lights, cabinets pipes, and plumbing, HVAC ducts, electrical boxes, etc.
5. Where floor openings are four inches or more in width and subject to traffic or loading, install cover plate systems capable of supporting same loading as floor.
6. Interface with Other Projects: Coordinate and cooperate with adjacent, contiguous and related materials trades, such as concrete, drywall, plumbing, conduit, electrical wiring, communication systems, etc., to ensure a proper and timely installation.

3.06 PROTECTION AND CLEANING

- A. Remove masking tape immediately after joints have been tooled.
- B. Clean adjacent surfaces free from sealant as the installation progresses. Use solvent or cleaning agent as recommended by the sealant manufacturer.
- C. Excess sealant should be removed from all surfaces while still uncured. Cured sealant is very difficult to remove without altering or damaging the surfaces to which the sealant has been misapplied.
- D. After installation and until Owner's acceptance, protect the Rated Firestop Systems from damage.
- E. Dispose of (away from site) all debris, trash, containers, residue, remnants and scraps which result from the work of this Section.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 08100 METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide all metal Doors and Frames, complete in-place, as shown on the drawings, specified herein or as required for a complete and proper installation.
- B. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.
- C. Related Work:
 - 1. Section 07900: Sealants and Caulking
 - 2. Section 08710: Finish Hardware
 - 3. Section 08800: Glass and Glazing
 - 4. Section 09260: Gypsum Wallboard Systems
 - 5. Section 09900: Painting

1.02 QUALITY ASSURANCE

- A. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Single Source: All work of this Section shall be produced by a single manufacturer unless otherwise approved by the Architect.
- C. Fire Rated Assemblies: Wherever a fire-resistance classification is shown or scheduled for metal doors and frames, provide fire-rated doors and frames investigated and tested as a fire door assembly, complete with type of fire door hardware to be used. Identify each fire door, and frame with recognized testing laboratory labels, indicating applicable fire rating of both door and frame. Construct assemblies to comply with NFPA Standard No. 80, and as herein specified.
- D. Certificates and Labels: Identify each door and frame with recognized labels and certificates.

TECHNICAL SPECIFICATIONS

1.03 REFERENCE STANDARDS

- A. NFPA Standard No. 80
- B. AIA (NBFU) Pamphlet No. 8
- C. Pressure Test: IBC 715.3.3 and UL 10C.
- D. Underwriters Laboratories
- E. "Recommended Locations for Builder's Hardware" published by the National Builder's Hardware Association.

1.04 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.
 - 1. Coordinate and submit together with the submittals required for Section 08710, Finish Hardware, and Section 08200, Wood Doors.
- B. Manufacturer's Data:
 - 1. Complete materials list of all items proposed to be furnished and installed under this Section.
 - 2. Manufacturers' specifications and other data required to demonstrate compliance with the specified requirements.
- C. Shop Drawings:
 - 1. Provide shop drawings showing details of each frame type, elevations of each door design type, details of all openings, all details of construction, installation, all anchorage, and certifications.
 - 2. Provide written documentation showing compliance with all required labels and certifications.

1.05 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary, and at no additional cost to the Owner.

TECHNICAL SPECIFICATIONS

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Hot Rolled Steel Sheets and Strips: Commercial quality carbon steel, pickled and oiled, complying with ASTM A-569 and ASTM A-568.
- B. Cold Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A-366 and ASTM A-568.
- C. Galvanized Steel Sheets: Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A-526, and ASTM A-525, G60 zinc coating, mill phosphatized.
- D. Supports and Anchors: Fabricate of not less than 18 gage galvanized sheet steel.
- E. Inserts, Bolts and Fasteners: Manufacturer's standard units, except hot-dip galvanized items to be built into exterior walls, complying with ASTM A-153, Class C or D as applicable.
- F. Shop Applied Paint: For steel surfaces, use rust-inhibitive baked enamel or paint, suitable as a base for specified finish paints.

2.02 FABRICATION

- A. General:
 - 1. Verify all measurements at the job site prior to fabrication.
 - 2. Fabricate steel door and frame units to be rigid, neat in appearance and free from defects, warp or buckle. Accurately form metal to required sizes and profiles.
 - 3. Wherever practicable, fit and assemble units in the manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at the site.
 - 4. Fabricate exposed faces of doors and panels from only cold-rolled steel.
 - 5. Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers and moldings from either cold-rolled or hot-rolled steel (at fabricator's option).
 - 6. Fabricate exterior doors, panels and frames from galvanized steel. Top edge of doors in exterior walls shall be fitted with a flush water-tight closure.
 - 7. Vertical edges shall join the face sheets by a continuous weld extending the full height of the door. Welds are to be ground, filled and dressed smooth to make them invisible and provide a smooth flush surface.
- B. Exposed Fasteners: Provide countersunk flat phillips for exposed screws and bolts:

TECHNICAL SPECIFICATIONS

C. Finish Hardware Preparation:

1. Prepare hollow metal units to receive mortised and concealed finish hardware, including cutouts, reinforcing. Drilling and tapping in accordance with final Finish Hardware Schedule and templates provided by hardware suppliers. Comply with applicable requirements of ANSI A-115.
2. Reinforce hollow metal units to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at site.
3. Locate finish hardware in accordance with "Recommended Locations for Builders Hardware", published by the National Builders Hardware Association.
4. Reinforce all doors for thru sex bolts at closers.

D. Shop Painting:

1. Clean, treat and paint exposed surfaces of fabricated hollow metal units, including galvanized surfaces.
2. Clean steel surfaces of mill scale, rust, oil, grease, dirt and other foreign materials before the application of the shop coat of paint.
3. Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive field-applied paint.

2.03 STANDARD METAL DOORS

- A. General: Provide metal doors of the types and styles indicated on the drawings or schedules. Sheet steel shall be 16 gage minimum each face for interior doors, 16 gage minimum for exterior doors, 12 gage minimum reinforcing for closer, 8 gage minimum reinforcing for hinges, and 16 gage minimum reinforcing for locks. Exterior doors shall be urethane core doors.

1. Form exterior doors of hot dip galvanized steel.

B. Door Louvers:

1. At all non-labeled doors calling for a louver, provide sightproof stationary louvers for interior doors where indicated, constructed of inverted V-shaped or Y-shaped blades formed of 24 gage cold-rolled steel set into 20 gage steel frame.
2. At all labeled doors calling for a louver: Airolite #FD264 fire-rated louvers with 135 deg. F. fusible link, U.L. approved and conforming to requirements of State Fire Marshal.

C. Glass-Mouldings and Stops:

1. Where specified or shown on drawings, doors shall be provided with hollow metal mouldings to secure glazing by others in accordance with glass opening sizes shown on approved shop drawings.

TECHNICAL SPECIFICATIONS

2. Loose stops shall be not less than 20 gage steel, with butt corner joints, secured to the framed opening by cadmium or zinc-coated countersunk screws. Snap-on attachments will not be permitted.
3. Glass mouldings and stops shall be prime painted ready to receive field applied paint.

2.04 STANDARD METAL FRAMES

A. General:

1. Provide metal frames of the types and styles indicated on the drawings or schedules. Metal frames shall be 16 gage for interior doors, 16 gage for exterior doors and shall be properly reinforced for the finish hardware specified in Division 8.
2. Provide metal frames for doors, and other openings, as shown on the drawings. Conceal all fastenings unless otherwise shown.
3. Fabricate frames of all welded construction. Miter and weld all corners. No mechanical interlocks.
4. Form exterior frames of hot dip galvanized steel.
5. Provide 16 gauge galvanized anchors at all frames of the following minimum quantities:
 - a. One floor clip per jamb, welded to frame.
 - b. Three wall anchors per jamb to 7'-2". Four wall anchors per jamb from 7'-3" to 9'-0". Add one additional wall anchor for each additional 2'-0" in height or fraction thereof. Welded to frame.
 - c. Two wall anchors per head at door pairs. One wall anchor per head at windows of 8'-0". Add one additional wall anchor for each additional 4'-0" in width or fraction thereof. Welded to frame.
 - d. Anchor styles shall be as indicated in the drawings or as approved in shop drawings.

B. Door Silencers: Drill stops to receive 2 silencers on strike jambs of single-swing frames and 2 silencers on heads of double-swing frames.

C. Plaster Guards: Provide 26 gage steel plaster guards or mortar boxes, welded to the frame, at back of all finish hardware cutouts where mortar or other materials might obstruct hardware operation.

2.05 NON-STANDARD DOORS AND FRAMES

A. When doors and frames are required which are not available from the manufacturer as stock items, provide such items as custom items constructed in conformance with the requirements for stock items within the profiles and size limitations shown on the drawings.

B. Where required by the drawings, provide with full thickness solid core of rigid rock wool cut out to fit between stiffeners and to fit hardware reinforcements.

TECHNICAL SPECIFICATIONS

- C. Install core to completely fill the interior of the door. Install similar core in frames in these openings.

2.06 OTHER MATERIALS

- A. All other materials not specifically described but required for a complete and proper installation shall be as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General: Install hollow metal units and accessories in accordance with manufacturer's data, and as herein specified.

- B. Placing Frames:

1. Except for frames located at in-place concrete or masonry openings, place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumb, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.
2. In masonry construction, locate 3 wall anchors per jamb at hinge and strike levels. Building-in of anchors and grouting of frames is specified in Division 4.
3. At in-place concrete or masonry construction, set frames and secure to adjacent construction with machine screws and masonry anchorage devices. If attached with screws, provide "Z" fillers at each screw location to prevent collapse or distortion of frames when screws are tightened.
4. When installed in prepared openings in concrete or masonry construction install sealant between frames and concrete or masonry in compliance with the requirements of Division 7.

- C. Door Installation:

1. Fit doors accurately in their respective frames, within clearances specified in S.D.I. 100.
2. Place fire-rated doors with clearance as specified in NFPA Standard No. 80.

- D. Caulk, seal and fasten so as to provide a complete weathertight installation.

TECHNICAL SPECIFICATIONS

3.03 CLEANING AND PROTECTION

- A. Final Adjustments: Check and readjust operating finish hardware items in hollow metal work just prior to final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames which are warped, bowed or otherwise damaged.
- B. Prime Coat Touch-up: Immediately after erection, sand smooth all rusted and damaged areas of prime coat and apply touch-up of compatible air-drying primer.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 08305 ACCESS DOORS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide all Access Doors complete, in place, as shown on the Drawings and specified herein or as required for a complete and proper installation.
- B. Documents affecting work of this section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.

1.02 QUALITY ASSURANCE

- A. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.03 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.
- B. Manufacturer's Data:
 - 1. The manufacturer's recommended installation procedures, including sizes, finishes, scheduled locations and details of adjoining work.
 - 2. Manufacturers' specifications and other data required to demonstrate compliance with the specified requirements.
 - 3. Manufacturer's recommended installation procedures.

1.04 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.

TECHNICAL SPECIFICATIONS

PART 2 - PRODUCTS

2.01 ACCESS PANELS

A. Acceptable Manufacturers:

1. Milcor.
2. Larsens.
3. Karp.
4. William Brothers.
5. Approved equal.

B. Provide plumbing chase access doors for the following installations: (Provide fire rated access doors at fire rated walls or ceilings.)

1. Drywall:

- a. Wall Installation: 14" x 14" access door, Milcor M, for drywall applications; 14 ga. steel door panel with baked on primer; two cylinder locks.
- b. Ceiling Installation: See Drawings. Flush panel access door, Milcor M, for drywall applications; 14 ga. steel door panel with baked on primer; two cylinder locks.
- c. Flush panels means the door is unobtrusive in appearance with concealed flange.

2. Masonry, Concrete, Tile:

- a. Wall Installation: 16" x 16"; 3/4" frame flange, Milcor Style M for masonry, concrete and tile applications. 14 gauge door panel with baked on primer, two cylinder locks. Provide Style MS, 16 gauge stainless steel door and frame for all wet, kitchen and toilet room applications.

3. Serviceable Equipment:

- a. Wall and Ceiling Installation: 8" x 8" hand access, 18" x 18" man access, Milcor Style M (as required for application). 14 gauge door panel with baked on primer, two cylinder locks. Provide Style MS, 16 gauge stainless steel door and frame for all wet, kitchen and toilet room applications

2.02 OTHER MATERIALS

A. All other materials not specifically described but required for a complete and proper installation shall be as selected by the Contractor subject to the approval of the Architect.

TECHNICAL SPECIFICATIONS

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which work of this Section will be installed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.
- B. Verify rough openings for door and frame are correctly sized and located.
- C. Beginning installation means acceptance of existing conditions.

3.02 INSTALLATION

- A. At all times during progress of the Work, coordinate as required with all other trades to ensure proper and adequate provision in the work of other trades for interface with the work required under this Section.
- B. Install frame plumb and level in ceiling openings.
- C. Position to provide convenient access to concealed work requiring access.
- D. Secure rigidly in place in accordance with manufacturer's instructions.

3.03 CLEANING AND PROTECTION

- A. Thoroughly clean all Access Doors prior to acceptance by the Owner.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 08361 INSULATED STEEL SECTIONAL DOORS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide Insulated Steel Sectional Doors and accessories complete, in place, as shown on the drawings, specified herein, and needed for a complete and proper installation.
- B. Documents affecting work of this Section include, but are not necessarily limited to Division 00 including, General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.
- C. Related Work:
 - 1. Section 09900: Painting
 - 2. Division 16: Electrical

1.02 QUALITY ASSURANCE

- A. Furnish all insulated steel sectional doors as complete units produced by one manufacturer, including hardware, accessories, mounting and installation components.
- B. Wind Loading:
 - 1. Deflection of the door in the horizontal position will not exceed 1/120 of opening width. Wind Loading Pressure: 30 psf.
- C. Qualifications of Installers: Installation of the doors shall be by skilled workmen thoroughly trained and experienced and who are completely familiar with the specified requirements and methods needed for proper performance of the work of this section.

1.03 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.
- B. Manufacturer's Data:
 - 1. Submit manufacturer's product data, roughing-in diagrams, and installation instructions for each type and size of insulated steel sectional door. Include operating instructions and maintenance information data. Transmit a copy of diagrams and installation instructions to Installer.

TECHNICAL SPECIFICATIONS

C. Shop Drawings:

1. Provide shop drawings showing rough-in dimensions for each type and size of door and the interface with the work of other trades.

1.04 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this section before, during, and after installation and to protect the work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 INSULATED STEEL SECTIONAL DOORS

A. Acceptable Manufacturers:

1. Overhead Door Company
2. CECO/Windsor Door
3. Kinnear Commercial/Industrial Sectional Doors
4. Approved Equal

B. Model Number: Provide Advanced Performance Insulated Sectional Doors, Model No. 850.

C. Weatherstrip:

1. Provide a PVC strip at bottom section to act as a seal at the sill and glazing.

D. Glazing:

1. Provide manufacturer's standard thermal glazing for the lites.

E. Operation:

1. Operation shall be electric operator; RHX Heavy Duty Commercial Operator.

F. Painting:

1. Zinc-coated steel surfaces are to be furnished with a chemically treated surface to aid in better paint adherence.

TECHNICAL SPECIFICATIONS

2.02 OTHER MATERIALS

- A. All other materials not specifically described, but required for a complete and proper installation shall be as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Installer must examine the substrates and conditions under which the insulated steel sectional door units are to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

3.02 INSTALLATION

- A. Installation is to be by manufacturer or his authorized representative.
- B. Install door and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports in accordance with final shop drawings, manufacturer's instructions, and as specified herein.
- C. Upon completion of installation including work by other trades, lubricate, test, and adjust doors to operate easily, free from warp, twist or distortion and fitting weathertight for the entire perimeter.
- D. Caulk, seal and fasten so as to provide a complete weathertight installation.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 08710 FINISH HARDWARE

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide Finish Hardware where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.
- C. Related Work:
 - 1. Section 08100: Metal Doors and Frames
 - 2. Section 08361: Insulated Steel Sectional Doors
 - 3. Section 15300: Fire Sprinkler System
 - 4. Section 16150: Wiring Connections

1.02 QUALITY ASSURANCE

- A. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Use components produced by manufacturers regularly engaged in the business of manufacturing, installing, and servicing Finish Hardware of the types required by this Section of these Specifications, and with a history of successful production acceptable to the Architect.
- C. Fire Rated Assemblies: Wherever a fire-resistance classification is shown or scheduled for doors and frames, provide fire-rated hardware investigated and tested as a part of fire door assembly. Identify with recognized testing laboratory labels, indicating applicable fire rating of the assembly. Construct assemblies to comply with NFPA Standard No. 89, AIA (NBFU) Pamphlet No. 8 and as herein specified.

1.03 REFERENCE STANDARDS

- A. A.I.A. (NBFU) Pamphlet No. 80 - Fire Rated Openings.
- B. National Fire Protection Association: NFPA Standard No. 80 - Fire Rated Openings.
- C. International Building Code: IBC-715.3.3/UL-10C (Positive Pressure and Smoke and Draft Control).

TECHNICAL SPECIFICATIONS

D. National Builder's Hardware Association: NBHA "Recommended Locations for Builders Hardware".

E. Americans with Disabilities Act (ADA)

1.04 SUBMITTALS

A. Submit the following submittals in accordance with the requirements in the General Conditions.

1. Coordinate the submittals required for this section with Section 08100: Metal Doors and Frames.

B. Manufacturer's Data:

1. Materials list of items proposed to be provided under this Section.

2. Manufacturers' specifications and other data needed to prove compliance with the specified requirements.

3. Manufacturers' recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

C. Shop Drawings:

1. Provide Shop Drawings utilizing the same references shown in the Door Schedule. Identify each hardware item by manufacturer, the manufacturer's catalog number, appropriate labels and the location of the item in the Work.

2. Contractor shall notify the Architect of any discrepancies or insufficiencies in the Hardware Groups in the Shop Drawings. Submission of the Shop Drawings shall be evidence of the Contractor's representation that the Finish Hardware constitutes a complete and proper installation.

3. Approval of the hardware list by the Architect shall not relieve the Contractor from the responsibility for furnishing all required finish hardware.

D. Samples:

1. Provide samples within 15 calendar days if requested by the Architect. Deliver to the Architect one (1) Sample of each finish hardware item requested.

E. Templates:

1. In a timely manner to ensure orderly progress of the Work, deliver templates or physical samples of the approved finish hardware items to pertinent manufacturers of interfacing items such as doors and frames.

TECHNICAL SPECIFICATIONS

1.05 PRODUCT HANDLING

- A. Packing and Marking: Individually package each unit of finish hardware, complete with proper fastenings and appurtenances, clearly marked on the outside to indicate the contents and specific locations in the Work.
- B. Protection: Use all means necessary to protect materials of this Section before, during, and after delivery to the job site and to protect the work and materials of all other trades.
- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.06 DELIVERY AND STORAGE

- A. Deliver all materials to the job site in their original unopened containers with all labels intact and legible at time of use. Store in strict accordance with the manufacturers' recommendations.

1.07 WARRANTY

- A. Provide the manufacturer's Standard Warranty for the following components:
 - 1. Closers: 5 year warranty.
 - 2. Hold Opens: 2 year warranty.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Provide Finish Hardware as listed in the Hardware Schedule and as needed for a complete and proper installation.
- B. Finish:
 - 1. Finishes of all hardware shall match the finish of the locksets. Take special care to coordinate all of the various manufactured items furnished under this Section, to ensure acceptably uniform finish.
- C. Fasteners:
 - 1. Furnish all finish hardware with all necessary screw, bolts, and other fasteners of suitable size and type to anchor the hardware in position for long life under hard use.
 - 2. Furnish fastenings where necessary with expansion shields, toggle bolts, sex bolts, and other anchors approved by the Architect, according to the material to which the hardware is to be applied and the recommendations of the hardware manufacturer.
- D. Fire Rating: Comply with UL requirements for fire rated openings for all hardware components.

TECHNICAL SPECIFICATIONS

E. Comply with ADA requirements.

2.02 LOCKSETS AND LATCHSETS

A. Acceptable Manufacturers:

1. Best
2. Approved equal.

B. Provide 40H Series Extra Heavy Duty Commercial mortise mechanisms; lever type.

1. Finish: 626 (US26D), Satin Chromium Plated.
2. Lever Style: 15
3. Rose: H

C. Latches:

1. Latch shall have 3/4" throw.

D. Strikes:

1. Provide 4-7/8" x 1-1/8" x 3/32" strike with dust box.

E. Cylinders:

1. 7 pin unit, High Security Cylinder with interchangeable core with construction master key feature.

F. Keying:

1. Review the keying system with the Owner and provide the type required (master, grandmaster or great-grandmaster) integrated with Owner's existing system.
2. Comply with the Owner's instructions for masterkeying and, except as otherwise indicated, provide individual change key for each lock which is not designated to be keyed alike with a group of related locks.
3. Key Quantity: Furnish 3 keys for each lock, 5 keys for each master and grandmaster system and one extra key blank for each lock.
4. Key Control: Provide a key control system including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers and permanent markers.

TECHNICAL SPECIFICATIONS

2.03 HINGES

A. Acceptable Manufacturers:

1. McKinney
2. Hager
3. Bommer
4. Approved equal.

B. Provide full mortise hinges with non-removable pins (NRP) at exterior doors.

1. Material:

- a. Interior Doors: Steel.
- b. Exterior Doors: Rust proof hinges; stainless steel.
- c. Wet Areas: Rust proof hinges; stainless steel.

2. Size: 4 1/2" x 4 1/2" unless noted otherwise.

3. Finish:

- a. Interior: 26D, Dull Chromium.
- b. Exterior: 32D, Stainless Steel.

C. Button tips and plugs standard on five knuckle hinges.

D. Where doors are required to swing 180 degrees, furnish hinges of sufficient throw to clear the trim.

2.04 CLOSERS

A. Acceptable Manufacturers:

1. LCN Closers
2. Approved equal.

B. Provide heavy duty surface mounted closers.

1. Finish: AL, Aluminum.

2.05 EXIT DEVICE

A. Acceptable Manufacturers:

1. Stanley

TECHNICAL SPECIFICATIONS

2. Approved equal.

B. Provide rim exit device.

1. Finish: US26D, Dull Chromium.

2.06 FLUSH BOLTS

A. Acceptable Manufacturers:

1. Quality

2. Door Controls, Int. (DCI)

3. Approved equal.

B. Provide 1/2" diameter Aluminum Extension Flush Bolt with Dustproof Strike.

1. Finish: US26D, Dull Chromium.

2.07 WALL BUMPERS, DOOR STOPS AND HOLDERS

A. Acceptable Manufacturers:

1. Quality/BBW/Trimco

2. Door Controls, Int. (DCI)

3. Glenn Johnson

4. Approved equal.

B. Provide Wall Bumpers/Door Stops with concealed attachments at each door. Provide proper type (wall or floor mounted) as applicable for each door. Provide 16 gauge metal backing in walls.

1. Finish: US26D, Dull Chromium.

2.08 PUSH/PULL UNITS

A. Acceptable Manufacturers:

1. Quality

2. BBW

3. Approved equal.

B. Provide 3" x 15" x 16"]push/pull units with exposed fasteners.

TECHNICAL SPECIFICATIONS

1. Finish: US26D, Dull Chromium.

2.09 THRESHOLDS AND DOOR BOTTOMS

A. Acceptable Manufacturers:

1. Pemko
2. Reese
3. Approved equal.

- ### B. Provide threshold saddle and handicap threshold saddle, extruded aluminum.

2.10 WEATHERSTRIP

A. Acceptable Manufacturers:

1. Pemko
2. Reese
3. Approved equal.

- ### B. Provide extruded aluminum with vinyl bubble weatherstrip.

2.11 SILENCERS

- ### A. Provide silencers in all metal door frames, or unless continuous bumper-type weatherstripping is shown or specified.
- ### B. Provide three (3) silencer units in single door frames, and provide four (4) silencer units in double door frames.
- ### C. Omit silencers from fire-rated door openings.

2.12 OTHER MATERIALS

- ### A. All other materials, not specifically described but required for a complete and proper installation, shall be as selected by the Contractor subject to the approval of the Architect.

2.13 HARDWARE SCHEDULE

- ### A. The Hardware Groups for each door are listed in the Door Schedule.

B. Quantity:

1. The Hardware Groups refer to one set of each item except for hinges which require (1-1/2 pair), unless noted otherwise.

TECHNICAL SPECIFICATIONS

- C. Other acceptable manufacturers, or others approved in advance by the Architect, may also be used.
- D. The Contractor shall be responsible for providing products of equal quality and function to those specified in the Hardware Schedule when utilizing a different approved manufacturer.
- E. The following manufacturers are listed in the Hardware Schedule unless noted otherwise.
 - 1. Locksets & Latches: Best
 - 2. Hinges: McKinney
 - 3. Closers: LCN
 - 4. Exit Device: Stanley
 - 5. Wall Bumpers: Trimco
 - 6. Push/Pull Units: Trimco
 - 7. Threshold: Pemko
 - 8. Weatherstrip: Pemko
 - 9. Smoke Gasket: Pemko

F. Hardware Groups:

NOTES

HW-1 (100A, 106, 107E, 108E)

Panic Device	2108 x 4908A	
Hinges	T4B3786	1-1/2 pair
Closer	4041	
Door Stop	1209	
Threshold	158A	
Weatherstrip	303AV	

HW-2 (100B, 100C, 108C, 108D)

Lockset	4CH-N	
Hinges	T4B3786	1-1/2 pair
Closer	4041	
Door Stop	1209	
Smoke Gasket	S88	

TECHNICAL SPECIFICATIONS

NOTES

HW-3 (100D)

Lockset	40H-D	
Hinges	T4B3786	1-1/2 pair
Smoke Gasket	S88	

HW-4 (102, 103)

Push	1001-3	
Pull	1013-3	
Closer	4041	
Hinges	T4B3786	1-1/2 pair
Smoke Gasket	S88	
Wall Bumper	1270CV	

HW-5 (104A)

Lockset	40H-R	
Flush Bolt	3915	2 ea.
Hinges	T4B3786	3 pair
Door Stop	1209	2 ea.
Smoke Gasket	S88	2 sets

HW-6 (104B)

Lockset	40H-G	
Hinges	T4B3786	1-1/2 pair
Wall Bumper	1207CV	
Smoke Gasket	S88	

HW-7 (105)

Lockset	40H-D	
Hinges	T4B3786	1-1/2 pair
Door Stop	1209	
Threshold	158A	
Weatherstrip	303AV	

HW-8 (202, 203)

Lockset	40H-AT	
Hinges	T4B3786	1-1/2 pair
Wall Bumper	1270CV	
Smoke Gasket	S88	

TECHNICAL SPECIFICATIONS

NOTES

HW-9 (201)

Lockset	40H-D	
Hinges	T4B3786	1-1/2 pair
Wall Bumper	1207CV	
Smoke Gasket	S88	

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Coordinate with Electrical to verify that all electrical connections for hardware are provided as required for a complete and proper installation.

3.02 INSTALLATION

- A. Mount hardware units at heights recommended in "Recommended Locations for Builders' Hardware" by NBHA, except as otherwise specifically indicated or required to comply with governing regulation, and except as may be otherwise directed by the Architect.
- B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Closers shall be mounted as directed by the Architect.
- C. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, install each item completely and then remove and store in a secure place during the finish application. After completion of the finishes, re-install each item. Do not install surface-mounted items until finishes have been completed on the substrate.
- D. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- E. Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- F. Cut and fit threshold and floor covers to profile of door frames, with mitered corners and hair-line joints. Joint units with concealed welds or concealed mechanical joints. Cut smooth openings for spindles, bolts and similar items, if any.
- G. Screw thresholds to substrate with No. 10 or larger screws, of the proper type for permanent anchorage and of bronze or stainless steel which will not corrode in contact with the threshold metal.
 - 1. On heavy-duty cast metal thresholds, provide not less than 3/8" diameter screw anchors.

TECHNICAL SPECIFICATIONS

- H. At exterior doors, and elsewhere as indicated, set thresholds in a bed of either butyl rubber sealant or polyisobutylene mastic sealant to completely fill concealed voids and exclude moisture from every source. Do not plug drainage holes or block weeps. Remove excess sealant.
- I. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Lubricate moving parts with type lubrication recommended by manufacturer (graphite-type if no other recommended). Replace units which cannot be adjusted and lubricated to operate freely and smoothly as intended for the application made.
- J. Adjust finish hardware for smooth operation. Adjust closers for proper tension such that the latch engages without undo force.
- K. Key System:
 - 1. At the time of final acceptance of the Work, void the construction key system and, in the presence of the Architect, demonstrate that the specified keying system is operating properly.
 - 2. Transmit the Keys, Master Keys and Key Control System to the Owner with an accurate transmittal of items submitted. The keys shall be submitted to the Owner directly for security purposes.

3.03 CLEANING AND PROTECTION

- A. Remove paint splatters and overspray from finish hardware.
- B. In addition to other stipulated requirements for cleaning, completely remove finger prints and traces of soil from surfaces of exposed portions, using only those cleaning materials recommended.

3.04 DEMONSTRATION AND TESTING

- A. Test, clean and adjust equipment and apparatus installed, to ensure performance will meet the intent of these specifications. The operation shall be tested in the presence of the Architect.
 - 1. Adjust and re-test any finish hardware not meeting requirements.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 08800 GLASS AND GLAZING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide all glass and glazing, complete, in place, as shown on the drawings, specified herein, or needed for a complete and proper installation.
- B. Documents affecting work of this section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.
- C. Related Work:
 - 1. Section 07900: Sealants and Caulking.
 - 2. Section 08100: Metal Doors and Frames.
 - 3. Section 08200: Wood Doors.
 - 4. Section 08511: Aluminum Windows.

1.02 QUALITY ASSURANCE

- A. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.
- B. Provide heat-strengthened (tempered) glass as required under provisions of the International Building Code.
- C. Provide listed and labeled assemblies, as required under provisions of the International Building Code.

1.03 REFERENCE STANDARDS

- A. "Glazing Manual" by Flat Glass Marketing Association.
- B. "Technical Services Report No. 104" by PPG Industries.

1.04 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.

TECHNICAL SPECIFICATIONS

B. Manufacturer's Data:

1. Complete materials list showing all proposed to be furnished and installed under this section;
2. Sufficient data to demonstrate that all such materials meet or exceed the specified requirements.

C. Samples:

1. Where requested by the Architect:
 - a. Provide not more than two 12" square samples of each type of glass.
 - b. Provide one 12" long sample each type and color of glazing sealant or gasket exposed to view. Install sample between two strips of samples of material to be glazed, fully cured. Hold strip apart to represent typical joint width.

1.05 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this section before, during, and after installation and to protect the work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary and at no additional cost to the owner.

PART 2 - PRODUCTS

2.01 GLASS

A. Acceptable Manufacturers:

1. Guardian Industries
2. Old Castle Glass
3. PPG Industries Idea Scapes
4. Approved Equal

- B. General: Glass is called by "type" on the drawings. The "types" are defined below. Note that glass showing excessive waviness, bubbles, discoloration or imperfections will be rejected.

- C. Tempering: Provide heat-strengthened (tempered) glass where called for on the drawings or in these specifications, and where such heat-strengthening or tempering would be required under provisions of the International Building Code.

TECHNICAL SPECIFICATIONS

D. Glass Types:

1. Type LR: Light-Reducing Plate Glass - Manufacturer's standard plate glass Bronze tinted, FS DD-G-451, Type 1, Class 1; 1/4" thick except as otherwise indicated.
2. Type CT: Clear, Tempered Plate Glass - Clear plate glass, FS DD-G-451, Type 1, Class 1, which has been heat-strengthened by manufacturer's standard process (after cutting to final size), to achieve a flexural strength of 4 times normal glass strength; 1/4" thick except as otherwise indicated.
3. Type LRI: Light Reducing Insulated Glass - Manufacturer's standard units of 2 sheets of 1/4" thick plate glass, exterior pane bronze tinted, interior pane clear, FS DD-G-451, Type 1, Class 1 and 3, Quality q3; permanently and hermetically sealed together at edges with spacers, sealant and metal protective edge binding; to provide a dehydrated air space 1/2" thick with 60 degrees F. dew point; fabricated to the sizes and shapes indicated.
4. Type LRI-T: Provide both panes of Type LRI tempered.
5. Type CI: Clear, Insulated Glass - Manufacturer's standard units of 2 sheets of 1/4" thick plate glass, exterior and interior panes shall be clear, FS DD-G-451, Type I, Class 1 and 3, Quality q3; permanently and hermetically sealed together at edges with spacers, sealant and metal protective edge binding; to provide a dehydrated air spaces indicated.
6. Type CI-T: Provide both panes of Type CI tempered where indicated.

2.02 GLAZING SEALANTS/COMPOUNDS

- A. General: Use glazing compounds and preformed glazing sealants approved for the application and, except as otherwise specified, conforming to the Glazing Materials portion of the FGMA Glazing Manual.
- B. Silicone Rubber Glazing Sealant: Silicone rubber, one-part elastomeric sealant, complying with FS TT- S-001543, Class A. Provide acid-type for non-porous channel surfaces, and provide non-acid type for porous channel surfaces (where any of the channel surfaces are porous).
- C. Butyl Rubber Glazing Sealant: Polymerized butyl rubber compound with inert fillers and pigments, solvent-based with 75% solids, non-sag, tack-free within 24 hours, paintable, non-staining.
- D. Preformed Butyl Rubber Glazing Sealant:
 1. Tape or ribbon (coiled on release paper) or polymerized butyl, or mixture of butyl and polyisobutylene, compounded with inert fillers and pigments, solvent-based with minimum of 95% solids, with thread or fabric reinforcement, tack-free within 24 hours, paintable, non- staining.
 2. Provide combination tape and encased continuous rubber shim, of approximately 50 durometer hardness.

TECHNICAL SPECIFICATIONS

2.03 GLAZING GASKETS

- A. Structural Rubber Glazing Gaskets: Neoprene extrusions with injection-molded corner units, fabricated into frames, with either integral or separate locking strips (zippers); comply with ASTM C542, Black.

2.04 MISCELLANEOUS GLAZING MATERIALS

- A. Setting Blocks: Neoprene, 70-90 durometer hardness, with proven compatibility with sealants used.
- B. Spacers: Neoprene, 40-50 durometer hardness, with proven compatibility with sealants used.
- C. Compressible Filler Rod (Cp-FR): Closed cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, proven to be compatible with sealants used, flexible and resilient, with 5-10 psi compression strength for 24% deflection.
- D. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.

2.05 OTHER MATERIALS

- A. All other materials not specifically described but required for a complete and proper installation of system shall be new, first quality of their respective kinds and subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which work of this section will be installed. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.
- B. Watertight and airtight installation of each piece of glass is required, except as otherwise shown. Each installation must withstand normal temperature changes, wind loading, impact loading, (for operating sash and doors) without failure of any kind including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glazing materials and other effects in the work.
- C. Protect glass from edge damage at all times during handling, installation, and operation of the building.
- D. Glazing channel dimensions as shown are intended to provide for necessary minimum bite on the glass, minimum edge clearance and adequate sealant thicknesses, with reasonable tolerances. The Glazier is responsible for correct glass size for each opening, within the tolerances and necessary dimensions established.

TECHNICAL SPECIFICATIONS

3.02 PREPARATION FOR GLAZING

- A. Clean the glazing channel, or other framing members to receive glass, immediately before glazing. Remove coatings which are not firmly bonded to the substrate. Remove lacquer from metal surfaces wherever elastomeric sealants are used.
- B. Apply primer or sealer to joint surfaces wherever recommended by sealant manufacturer.

3.03 INSTALLATION

- A. Comply with combined recommendations of glass manufacturer and manufacturer of sealants and other materials used in glazing, except where more stringent requirements are shown or specified, and except where manufacturer's technical representatives direct otherwise.
- B. Comply with "Glazing Manual" by Flat Glass Marketing Association except as shown and specified otherwise, and except as specifically recommended otherwise by the manufacturers of the glass and glazing materials.
- C. Cut and install colored (tinted) glass as recommended in "Technical Services Report No. 104" by PPG Industries.
- D. Install sealants as by the sealant manufacturer.
- E. Inspect each piece of glass immediately before installation and eliminate any which have observable edge damage or face imperfections.
- F. Unify appearance of each series of lights by setting each piece to match others as nearly as possible. Inspect each piece and set with pattern, draw and bow oriented in the same direction as other pieces.
- G. Install setting blocks of proper size at quarter points of sill rabbet. Set blocks in thin course of the heel-bead compound, if any.
- H. Provide spacers inside and out, and of proper size and spacing, for all glass sizes larger than 50 united inches, except where gaskets are used for glazing. Provide 1/8" minimum bite of spacers of glass and use thickness equal to sealant width, except with sealant tape use thickness slightly less than final compressed thickness of tape.
- I. Voids and Filler Rods: Prevent exudation of sealant or compound by forming voids or installing filler-rods in the channel at the heel of jambs and head (do not leave voids in the sill channels) except as otherwise indicated, depending on light size, thickness and type of glass, and complying with manufacturer's recommendations.
- J. Do not attempt to cut, seam, nip or abrade glass which is tempered, heat strengthened, or coated.
- K. Force sealants into channel to eliminate voids and to ensure complete "wetting" or bond of sealant to glass and channel surfaces. DO NOT proceed with installation of liquid sealants under adverse weather or temperature conditions.

TECHNICAL SPECIFICATIONS

- L. Tool exposed surfaces of glazing liquids and compounds to provide a substantial "wash" away from the glass. Install pressurized tapes and gaskets to protrude slightly out of the channel, so as to eliminate dirt and moisture pockets.
- M. Clean and trim excess glazing materials from the glass and stops or frames promptly after installation, and eliminate stains and discoloration.
- N. Where wedge-shaped gaskets are driven into one side of the channel to pressurize the sealant or gasket on the opposite side, provide adequate anchorage to ensure that gasket will not "walk" out when subject to dynamic movement. Anchor gasket to stop with matching ribs, or by proven adhesives, including embedment of gasket tail in cured heel bead.
- O. Gasket glazing: Miter cut and bond ends together at corners where gaskets are used for channel glazing, so that gaskets will not pull away from corners and result in voids or leaks in the glazing system.

3.04 PROTECTION AND CLEANING

- A. Cure glazing sealants and compounds in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength internal cohesive strength and surface durability.
- B. Protect exterior glass from breakage immediately upon installation, by attachment of crossed streamers to framing held away from glass. Do not apply markers of any type to surfaces of glass.
- C. Remove and replace glass which is broken, chipped, cracked, abraded, or damaged in other ways during the construction period, including natural causes, accidents and vandalism.
- D. Maintain glass in a reasonably clean condition during construction so that it will not be damaged by corrosive action and will not contribute (by wash-off) to the deterioration of glazing materials and other work.
- E. Wash and polish on both faces not more than four (4) days to Owner's acceptance of the work in each area. Comply with glass manufacturer's recommendations.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 09260 GYPSUM WALLBOARD SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide all gypsum drywall and accessories, complete, in place, as shown on the drawings, specified herein, and needed for a complete and proper installation.
- B. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.
- C. Related Work:
 - 1. Section 05400: Lightgauge Metal Framing
 - 2. Section 06100: Rough Carpentry
 - 3. Section 09900: Painting

1.02 QUALITY ASSURANCE

- A. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Fire Resistive Rating: Where work is indicated for fire-resistance ratings including those required to comply with governing regulations, provide materials and installation identical with applicable assemblies which have been tested and listed by recognized authorities, including UL.
- C. Manufacturer: Obtain gypsum boards, trim accessories, adhesives and joint treatment products from a single manufacturer, or from manufacturers recommended by the prime manufacturer of the gypsum boards.

1.03 REFERENCE STANDARDS

- A. Comply with applicable requirements of GA-216, "Application and Finishing of Gypsum Board", and GA-600, "Fire Resistance Design Manual" by the Gypsum Association, except where more detailed or more stringent requirements are indicated, including the recommendation of the manufacturer.
- B. Federal Specification SS-L-30.

TECHNICAL SPECIFICATIONS

1.04 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.
- B. Manufacturers' Data:
 - 1. Complete materials list of all items proposed to be furnished and installed under this Section.
 - 2. Manufacturers' specifications and other data required to demonstrate compliance with the specified requirements.
- C. Submit details showing compliance with U.L. or rated assemblies.

1.05 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect materials of this section before, during, and after installation and to protect installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.06 DELIVERY AND STORAGE

- A. Deliver all materials to the job site in their original unopened containers with all labels intact and legible at time of use. Store in strict accordance with the manufacturers' recommendations. All materials shall be covered if they are stored outside.

PART 2 - PRODUCTS

2.01 GYPSUM WALLBOARD

- A. General: All gypsum wallboard shall conform to Fed. Spec. SS-L-30, type III, taper-edged, and of the grade specified below. Supply the gypsum wallboard in 120 cm (48") widths and in such lengths as will result in a minimum of joints.
- B. Regular Gypsum Wallboard:
 - 1. Grade R, 5/8" thick.
- C. Fire Retardant Gypsum Wallboard:
 - 1. Grade X, 5/8" thick.
- D. Water Resistive Gypsum Wallboard:
 - 1. 5/8" thick and used on all walls in wet areas.

TECHNICAL SPECIFICATIONS

E. Interior Tile Backer Board:

1. Acceptable Manufacturers:
 - a. United States Gypsum Co. "Durock".
 - b. Approved equal.
2. 5/8" thick and used as a substrate for ceramic and other wall tiles.

2.02 METAL TRIM

- A. Metal trim features for gypsum wallboard shall be formed from zinc-coated steel not lighter than 26 gage nominal thickness.
- B. Casing beads shall be channel-shaped with a concealed wing not less than 7/8" wide, and an exposed wing. The exposed wing may be covered with paper cemented to metal and shall be suitable for joint treatment.
- C. Corner beads shall be angle-shaped with wings not less than 7/8" wide, and perforated for nailing and joint treatment, or with combination metal and paper wings, bonded together, not less than 1-1/4" wide and suitable for joint treatment.
- D. Edge beads for use at perimeter of ceilings shall be angle-shaped with wings not less than 3/4" wide. Concealed wing shall be perforated for nailing and exposed wing edge folded flat. Exposed wing may be factory finished in a white color.
- E. Edge beads for use as a finish edge at all door and window jambs, and where objects protrude through the gypsum board.
- F. Resilient furring channels shall be RF channels hot dipped galvanized.
- G. Column Collars:
 1. Acceptable Manufacturers:
 - a. Fry Reglet Corp.
 - b. Approved equal.

2.03 JOINTING SYSTEM

- A. The jointing system shall include reinforcing tape and compound designed as a system to be used together and shall be only as recommended by the manufacturer of the gypsum wallboard used. Jointing compound may be used for finishing if so recommended by the manufacturer.

2.04 FASTENING DEVICES

- A. Screws: For fastening the gypsum wallboard in place, use flathead screws, shouldered, specially designed for use with power-driven tools. Type and size as recommended by manufacturer of gypsum wallboard.

TECHNICAL SPECIFICATIONS

2.05 WATER FOR COMPOUND

- A. If the approved jointing system requires job-addition of water, use only clean and potable water for that purpose.

2.06 OTHER MATERIALS

- A. All other materials, not specifically described but required for a complete and operable installation of the work of this Section, shall be new, first quality of their respective kinds, and subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection: Prior to installation of the work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence. Verify that gypsum drywall may be installed in strict accordance with all pertinent codes and regulations, the manufacturers' recommendations and the original design.
- B. Discrepancies: Do not install gypsum drywall until all unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General: Install the gypsum wallboard with the separate boards in moderate contact but not forced into place. At internal and external corners, conceal the cut edges of the board by the overlapping covered edges of the abutting boards. Stagger the boards so that corners of any four boards will not meet at a common point except in vertical corners.
- B. Ceilings: Install the gypsum wallboard to ceilings with the long dimension of the wallboard at right angles to the supporting members, except that wallboard may be installed with the long dimensions parallel to supporting members that are spaced 16" on center when attached members are provided at end joints.
- C. Walls: Install the gypsum wallboard (single layer or double layer as shown) to studs at right angles to the furring or framing members. Make end joints, where required, over furring or framing members. Joints at double layer applications shall be a minimum of 16" lap.
- D. Attaching:
 - 1. Drive the specified screws with clutch-controlled power screwdrivers, spacing the screws 8" o.c. at panel edges and 12" o.c. in the panel field. Do not drive screws closer than 3/8" from edges and ends of gypsum panels. Do not penetrate paper with head of screws.

TECHNICAL SPECIFICATIONS

3.03 JOINT TREATMENT

A. General:

1. Inspect all areas to be joint treated, ascertaining that the gypsum wallboard fits snugly against supporting framework. All joints shall receive joint treatment, unless otherwise noted.
2. In areas where joint treatment and compound finishing will be performed, maintain a temperature of not less than 55 degrees F for 24 hours prior to commencing treatment, for the entire period of treatment, and until joint and finishing compounds have dried.
3. Apply the joint treatment and finishing compound by machine or hand tool.
4. Provide a minimum drying time of 24 hours between coats, and additional drying time in poorly ventilated areas.

B. Embedding Compound: Apply to gypsum wallboard joints and fastener heads in a thin uniform layer. Spread the compound not less than 3" wide at joints, center the reinforcing tape in the joint, and embed the tape in the compound. Then spread a thin layer of compound over the tape. After this treatment has dried, apply a second coat of embedding compound to joints and fastener heads, spreading in a thin uniform coat to not less than 6" wide at joints, and feather edged. When thoroughly dry, sandpaper to eliminate ridges and high points.

C. Finishing Compound: After embedding compound is thoroughly dry and has been completely sanded, apply a coat of finishing compound to all joints and fastener heads. Feather the finishing compound to not less than 12" wide. When thoroughly dry, sandpaper to obtain uniformly smooth surfaces, taking all necessary care to not scuff the paper surface of the wallboard.

D. Finish Coat: Provide the following finish coats:

1. Typical Walls: Medium Texture.
2. Ceilings: Medium Texture.
3. Areas Receive Epoxy: Smooth Wall.

3.04 CORNER TREATMENT

A. Internal Corners: Treat as specified for joints, except that the reinforcing tape shall be folded lengthwise through the middle and fitted neatly into the corner.

B. External Corners:

1. Install a corner bead fitting neatly over the corner and secured with the same type fasteners used for applying the wallboard, spacing the fasteners approximately 6" on centers and driving the wallboard into the framing or furring members.

TECHNICAL SPECIFICATIONS

2. After the corner piece has been secured into position, treat the corner with joint compound and reinforcing tape as specified for joints, feathering the joint compound out from 8" to 10" on each side of the corner.

3.05 OTHER METAL TRIM

- A. General: The drawings do not purport to show all locations and all requirements for metal trim in connection with the work of this Section. Carefully study the drawings and the installation; provide in place all metal trim normally recommended by the manufacturer of the gypsum wallboard used.
- B. Installation: Install the metal trim in strict accordance with the manufacturer's recommended methods of installation, providing not less embedment and finishing than specified above for corner treatment.

3.06 CLEANING AND PROTECTION

- A. Cleaning Up: In addition to the requirements of the General Conditions and sections of these specifications, use all necessary care during execution of this portion of the work to prevent scattering of gypsum wallboard scraps and dust and to prevent tracking of joint and finishing compound onto floor surfaces. At completion of each segment of installation in a room or space, properly pick up and remove from the working area all scraps, debris, and surplus material of this section.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 09510 ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide all Acoustical Ceilings and accessories, complete, in place, as shown on the drawings, specified herein, and needed for a complete and proper installation.
- B. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.
- C. Related Work:
 - 1. Section 05400: Lightgauge Metal Framing
 - 2. Section 07900: Sealants and Caulking
 - 3. Section 09260: Gypsum Wallboard System
 - 4. Division 15: Mechanical
 - 5. Division 16: Electrical

1.02 QUALITY ASSURANCE

- A. Installation of the acoustical ceilings shall be by an experienced installation firm which is acceptable to the manufacturer of the acoustical units, as shown by current written statement from the manufacturer.
- B. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- C. Fire Hazard Classification: UL tested, listed and labeled as "Class 0-25".
- D. Fire Resistance Rating: UL tested, listed and labeled for the UL design and hours of resistance as indicated.

1.03 REFERENCE STANDARDS

- A. Utilize the Standards listed below:
 - 1. ASTM 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

TECHNICAL SPECIFICATIONS

2. ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
3. ASTM A1008 "Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability".
4. ASTM C423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
5. ASTM C635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
6. ASTM C636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
7. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
8. ASTM E1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.
9. ASTM E1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems
10. ASTM E1264 Classification for Acoustical Ceiling Products.
11. ASTM E1477 Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
12. ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
13. ASTM E119 Standard Test Method for Fire Tests of Building Construction and Material.
14. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components.

1.04 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.
- B. Manufacturer's Data:
 1. Manufacturer's product specifications and installation instructions for each acoustical ceiling material required, and for each suspension system, including certified laboratory test reports and other data as required to show compliance with these specifications. Distribute one additional copy of each installation instruction to the Installer.

TECHNICAL SPECIFICATIONS

- a. Include manufacturer's recommendations for cleaning and refinishing acoustical units, including precautions against materials and methods which may be detrimental to finishes and acoustical performances.
- C. Samples:
1. Submit one 12" square sample for each acoustical unit required. Show the full range of exposed color and texture to be expected in the completed work. Sample submittal and Architect's review will be for color and texture only. Compliance with other requirements is the exclusive responsibility of the Contractor.
 2. Submit one 12" long sample of each exposed runner and molding. Architect's review will be for color and texture only. Compliance with other requirements is the exclusive responsibility of the Contractor.

1.05 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect materials of this section before, during and after installation and to protect installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.06 DELIVERY AND STORAGE

- A. Deliver all materials to the job site in their original, unopened containers with all labels intact and legible at time of use. Store in strict accordance with the manufacturers' recommendations.

PART 2 - PRODUCTS

2.01 EXPOSED GRID LAY-IN TILE SYSTEM

- A. Acoustical Lay-In Panels:
 1. Acceptable Manufacturers:
 - a. Armstrong
 - b. U.S.G. Interiors, Inc.
 - c. Celotex
 - d. Approved equal.
 2. Acoustic Panels: Furnish conforming to the materials listed in the CISCA Guide and as referenced as specified hereinafter.
 - a. 2 x 4 Standard Mineral Fiber Panels - Non-Rated:
 - (1) Size: 24 x 48 inches.
 - (2) Minimum thickness: 5/8 inch.
 - (3) NRC: .55 minimum

TECHNICAL SPECIFICATIONS

- (4) STC: 35
- (5) Light Reflectance: 0.85
- (6) Flame Resistance: "A"
- (7) Flame Spread: 25 or less (Fed. Spec. SS-S-118B)
- (8) Exposed Edges: Square.
- (9) Pattern: Armstrong World Ind. "Georgian" #763 medium texture lay-in panel or approved substitute.
- (10) Finish: Factory-applied white vinyl-latex paint.

B. Exposed Grid System:

1. Acceptable Manufacturers:
 - a. Armstrong - Berc 2 Installation System
 - b. Approved equal.
2. Suspended Ceiling System: Main runners and cross tees 15/16", 1-1/2" high Prelude XL System, double web, direct hung suspension.
3. Comply with ASTM C635 as applicable to the type of suspension system required for the type of Acoustical Lay-In Panel indicated.
 - a. Structural Class: Heavy Duty.
4. Attachment Devices: In accordance with the International Building Code, Section 1621.5 for Category D.
 - a. Hanger Wires: In accordance with the International Building Code, Section 1621.5.
5. Edge Moldings: In accordance with the International Building Code, Section 1621.5 for Category D.
6. Exposed Suspension System Members: Manufacturer's standard exposed runners, cross-runners and accessories of the types and profiles indicated, with exposed cross-runners coped to lay flush with main runners.
 - a. Finish of Exposed Members: Provide uniform factory-applied finish on exposed surfaces of ceiling suspension system including trim and accessories.
 - b. Color: Satin White standard coating.

2.02 OTHER MATERIALS

- A. Provide all other materials not specifically described but required for a complete and proper installation as selected by the Contractor subject to the approval of the Architect.

TECHNICAL SPECIFICATIONS

PART 3 - EXECUTION

3.01 INSPECTION

- A. Installer must examine the conditions under which the acoustical ceiling work is to be performed and notify the Contractor in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.
- B. Measure each ceiling area and establish layout of acoustical unit to balance border widths at opposite edges of each ceiling. Avoid the use of less-than-half width units at borders, and comply with reflected ceiling plans wherever possible.

3.02 JOB CONDITIONS

- A. Space Enclosure: Do not install interior acoustical ceilings until space has been enclosed and is weather-tight, and until wet-work in the space has been completed and is nominally dry, and until work above ceilings has been completed, and until ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

3.03 INSTALLATION - EXPOSED GRID LAY-IN TILE SYSTEM - CATEGORY D

- A. General: Install materials in accordance with manufacturer's printed instructions, and to comply with governing regulations, fire resistance rating requirements as indicated, and industry standards applicable to the Work.
- B. Arrange acoustical units and orient directionally-patterned unit as directed by the Architect.
 - 1. Install tile with pattern running in one direction.
- C. Install suspension systems to comply with the International Building Code, Section 1621.5, and with the authorities having jurisdiction.
- D. Install edge moldings of the type indicated at edges of each ceiling area, and at locations where edge of units would otherwise be exposed after completion of the work.
 - 1. Sealant Bed: Apply continuous ribbon of acoustical sealant concealed on back of vertical leg before fastening to vertical surface.
 - 2. Level moldings with ceiling suspension system, to a level tolerance of 1/8" in 12'-0".
 - 3. Miter corners of moldings accurately to provide hair-line joints, securely connected to prevent dislocation.
 - 4. Grind or score surface of split face block to provide smooth mounting surface for edge moldings.
- E. Cope exposed flanges of intersecting suspension system members, so that flange faces will be flush (cope flange of member supported by other member).

TECHNICAL SPECIFICATIONS

- F. Install acoustical panels in coordination with suspension system.
- G. Scribe and cut tile to fit accurately at edges of ceiling and around penetrations in the ceiling.
- H. Install edge trim moldings as needed to conceal edges of acoustical units which would otherwise be exposed to view after completion of the work. Anchor with fasteners or, if not possible, secure in place with permanent adhesive.
- I. Provide hold down clips for each panel, spaced as recommended by the panel manufacturer for the application indicated.
- J. Provide a continuous sealant bead between the edge moldings and the adjacent wall surface, typically, at all wall conditions.

3.04 CLEANING AND PROTECTION

- A. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings and suspension members. Comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.
- B. The Installer shall advise the Contractor of required protection for the acoustical ceilings, including temperature and humidity limitations and dust control, so that the work will be without damage and deterioration at the time of acceptance by the Owner.

3.05 EXTRA MATERIALS

- A. Provide an amount equal to 1% of the amount installed of each type and color of tile. Furnish full size units matching the units installed, packaged with protective covering for storage and identified with appropriate labels. Deliver to a location as directed by the Owner.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 09680 CARPETING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide all Carpeting and accessories complete, in place, as shown on the Drawings, specified herein, and needed for a complete and proper installation.
- B. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.
- C. Related Work:
 - 1. Section 09650: Resilient Flooring

1.02 QUALITY ASSURANCE

- A. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.03 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.
- B. Shop Drawings
 - 1. Indicate the seam layout, direction of carpet, method of joining seams, type of adhesive and the method of integrating edge strips with carpet.
- C. Manufacturer's Data:
 - 1. Complete materials list of all items proposed to be furnished and installed under this Section.
 - 2. Manufacturer's specifications and other data required to demonstrate compliance with specified requirements.
 - 3. Manufacturer's recommended installation procedures.
- D. Samples:
 - 1. Provide three (3) samples of the full range of colors and patterns of carpet and of exposed accessories available from the proposed manufacturers in the specified qualities.

TECHNICAL SPECIFICATIONS

1.04 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.
- B. Replacement: In the event of damage, immediately make all repairs and replacements needed at no additional cost to the Owner.

1.05 DELIVERY AND STORAGE

- A. Deliver all materials to the job site in their original unopened containers with all labels intact and legible at time of use. Store in strict accordance with the manufacturers' recommendations.
- B. Carpet rolls shall have register number and tag attached or register numbers stenciled on bale and intact until time of use.

1.06 WARRANTY

- A. Provide the manufacturer's Lifetime Commercial Limited warranty for materials and workmanship.

PART 2 - PRODUCTS

2.01 CARPET TILE

- A. Acceptable Manufacturers:
 - 1. Shaw Contract Group
 - 2. Approved equal.
- B. Attributes: Provide carpet tile with at least the following minimum quality:
 - 1. Style Name: Color Play Tile
 - 2. Style Number: 59358
 - 3. Construction: Multi-level pattern loop
 - 4. Fiber: Eco Solution Q® Nylon
 - 5. Dye Method: 89% solution dyed, 11% yarn dyed.
 - 6. Pattern Repeat: None
 - 7. Tufted Weight: 18.0
 - 8. Gauge: 1/12

TECHNICAL SPECIFICATIONS

9. Stitches per Inch: 9.0
10. Finished Pile Thickness: 0.085
11. Total Thickness: 0.268
12. Average Density: 7624
13. Product Size: 24" x 24"
14. Primary Backing: Synthetic
15. Secondary Backing: Ecoworx® Tile
16. Protective Treatments: SSP® Shaw Soil Protection
17. GSA Approved Product: Yes

2.02 CARPET TILE ADHESIVE

- A. Provide adhesive and cleaner sealer as recommended by the carpet tile manufacturer.

2.03 RUBBER BASE

- A. Acceptable Manufacturers:

1. Burke
2. Flexco
3. Roppe
4. Approved equal.

- B. Rubber base shall be constructed of first quality materials properly vulcanized and free from imperfections; 1/8" thick and 4" high typically, continuous length; with standard toe base.
- C. Adhesives shall be nonflammable, waterproof and stable type as recommended by the manufacturer. Asphalt emulsions and other non-waterproof type will not be acceptable.

2.04 EDGE STRIPS

- A. Provide edge strips at all carpet terminations.

2.05 OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

TECHNICAL SPECIFICATIONS

PART 3 - EXECUTION

3.01 JOB CONDITIONS

- A. Maintain room temperature at a minimum of 60°F. for at least 24 hours prior to installation.
- B. Do not commence with carpet installation until painting and finish work is complete.

3.02 INSPECTION

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.
- B. Check matching of carpet before cutting and ensure there is no visible variation between dye lots.

3.03 SURFACE PREPARATION

- A. Cleaning: Immediately prior to installation of the work of this Section, thoroughly clean all substrata and remove all oil, grease, paint, varnish, hardeners, and other items which would adversely affect the bond of adhesive.
- B. Smoothing: Make all substrata level and free from irregularities. Assure one constant floor height after carpet is installed, grinding high spots and filling low spots as required.

3.04 CARPET TILE INSTALLATION

- A. Install in strict accordance with manufacturer's recommendations.

3.05 INSTALLATION - RUBBER BASE AND STAIR TREADS

- A. Install the Rubber Base and Stair Treads in strict accordance with the manufacturer's written instructions.
- B. Rubber cove base shall be installed continuously without joint for the entire length of the wall.
- C. Rubber carpet base shall be installed at sections.

3.06 CLEANING AND PROTECTION

- A. Do not place heavy objects such as furniture on carpeted surfaces for minimum of 24 hours or until adhesive is set.
- B. Provide a heavy non-staining paper or plastic walkway as required over carpeting in direction of foot traffic, maintaining intact until carpeted space is accepted by the Owner.
- C. Thoroughly clean, remove loose threads with scissors, and vacuum all carpet surfaces prior to final acceptance by the Owner.

TECHNICAL SPECIFICATIONS

3.07 EXTRA MATERIAL

- A. Provide an amount equal to 1% of the amount installed for the Owner. Provide extra material consisting of each color and pattern supplied.
- B. The extra material shall be in a roll. Scraps will not be acceptable.
- C. Deliver to a location as directed by the Owner, and obtain signature from Owner indicating receipt.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 09900 PAINTING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:

1. Provide Painting of all exterior and interior exposed surfaces, unless noted otherwise, where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
2. Provide Painting of Mechanical and Electrical equipment which is not factory finished including, but not limited to, the following:
 - a. Roof Top Units
 - b. Switchgear
3. Provide Painting of the following unexposed or concealed spaces:
 - a. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
 - b. Finish doors on tops, bottoms and side edges the same as the faces, unless otherwise indicated.
 - c. On all removable and all hinged panels, paint the back sides to match the exposed sides.
4. Provide Painting of the following items which are not required to be painted when located in a concealed space, but are required to be painted when exposed below the ceiling, in rooms with no ceilings or on the exterior:
 - a. Beams, trusses, joists, girders and other structural members that are not fireproofed.
 - b. Underside of the metal deck or concrete deck.
 - c. Piping, pipe hangers and supports.
 - d. Ductwork, insulation and supports.
 - e. Conduit and fittings
5. Electrical panels shall be painted to match wall color. Factory finished surfaces must be prepared to receive new paint.

B. Work Not Included:

1. Priming and finishing of certain surfaces that are specified to be factory performed or installer performed under pertinent other Sections.
2. Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze, and similar finished materials.

TECHNICAL SPECIFICATIONS

3. Moving parts of operating units; mechanical or electrical parts such as valve operators, linkages, sinkages, sensing devices, and motor shafts.
 4. Surfaces concealed and made inaccessible by panel boards, fixed ductwork, machinery and equipment fixed in place.
 5. Surfaces in concealed spaces such as above suspended ceilings, furred spaces, attic spaces, crawl spaces and chases.
 6. Surfaces of steel to be embedded in concrete.
 7. Factory finished materials.
- C. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.
- D. Related Work:
1. Section 03300: Cast-in-Place Concrete
 2. Section 05500: Metal Fabrication
 3. Section 07600: Flashing & Sheet Metal
 4. Section 08100: Metal Doors and Frames
 5. Section 08125: Aluminum Windows
 6. Section 08305: Access Doors
 7. Section 08360: Insulated Steel Rolling Doors
 8. Section 09260: Gypsum Wallboard Systems
 9. Section 10999: Miscellaneous Specialties
 10. Division 15: Mechanical
 11. Division 16: Electrical

1.02 QUALITY ASSURANCE

- A. Provide at least one person who shall be present at all times during execution of the work of this Section, who shall be thoroughly familiar with the specified requirements and the materials and methods needed for their execution, and who shall direct all work performed under this Section.
- B. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the

TECHNICAL SPECIFICATIONS

specified requirements and the methods needed for proper performance of the work of this Section.

- C. Notify the Architect in writing of anticipated problems in using the specified coating systems over prime-coating supplied under other Sections.

1.03 REFERENCE STANDARDS

A. Federal Specifications (Fed. Spec.):

1. TT-C-542E Coating, Polyurethane, Oil Free, Moisture Curing
2. TT-C-555B& Am 1 Coating, Textured (for Interior and Exterior Masonry Surfaces)
3. TT-E-487E Enamel, Floor and Deck
4. TT-E-489G Enamel, Alkyd, Gloss (for Exterior and Interior Surfaces)
5. TT-E-496B & Am 2 Enamel, Heat-Resisting (400° F), Black
6. TT-3-505A & AM 3 Enamel, Odorless, Alkyd, Interior, High Gloss, White and Light Tints
7. TT-E-509B & Am 2 Enamel, Odorless, Alkyd, Interior Semigloss, White and Tints
8. TT-E-545B Enamel, Odorless, Alkyd, Interior Undercoat, Flat Tints and White
9. TT-3-1593B Enamel, Silicone Alkyd Copolymer, Gloss (For Exterior and Interior Use)
10. TT-G-410E & Am 1 Glazing Compound, Sash (Metal) for Back Bedding and Face Glazing (Not For Channel or Stop Glazing)
11. TT-P-19C & Am 2 Paint, Acrylic Emulsion, Exterior
12. TT-P-28F Paint, Aluminum, Heating Resisting (1200° F)
13. TT-P-29J & Am 1 Paint, Latex-base, Interior, Flat, White and Tints
14. TT-P-38D & Am 1 Paint, Aluminum, Ready-mixed
15. TT-P-55B & Am 2 Paint, Polyvinyl Acetate Emulsion, Exterior
16. TT-P-98C Paint, Stencil, Flat
17. TT-P-102E Paint, Oil, Alkyd, Modified, Exterior
18. TT-P-320D Pigment, Aluminum, Powder and Paste, for Paint

TECHNICAL SPECIFICATIONS

19. TT-P-650C & Am 1 Primer Coating, Latex Base, Interior, White (for Gypsum Wallboard)
 20. TT-P-00791A & Am 2 Putty: Linseed-oil Type (for Wood-sash Glazing)
 21. TT-P-1511A & Am 2 Paint, Latex-base, Gloss and Semi-Gloss, Tints and White(For Interior Use)
 22. TT-P-1728A Paint, Latex-base, Flat, Deep Tone
 23. TT-S-711C Stain; Oil Type, Wood Interior
 24. TT-S-176E & Am 1 Sealer, Surface, Varnish Type, Floor, Wood or Cork
 25. TT-S-179B & Am 1 Sealer, Surface, Pigmented Oil, for Plaster and Wallboard
 26. TT-S-230A & Am 1 Sealing Compound, Synthetic-rubber Base, Single-component, Chemically Curing (for Calking, Sealing and Glazing in Building Construction)
 27. TT-V-81G Varnish, Mixing, for Aluminum Paint
 28. TT-V-119D & Am 2 Varnish, Spar, Phenolic Resin
- B. Occupational Safety and Health Administration (OSHA) Publication:
1. 29 CFR 1910 Safety and Health Standards
- C. American Society for Testing and Materials (ASTM) Publications:
1. D 96-73 Test Method for Water and Sediment in Crude Oils
 2. D 523-78 Test Method for Specular Gloss
 3. D 562-55 Consistency of Paints Using Stormer Viscometer
 4. D 1640-69 Test Method for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature
 5. D 1737-62 Test for Elongation of Attached Organic Coatings with Cylindrical Mandral Apparatus
 6. D 3273-76 Test Method for Resistance to Growth of Mold in the Surface of Interior Coatings in an Environmental Chamber
 7. D 3274-76 Method of Evaluating Degree of Surface Disfigurements of Paint Films by Fungal Growth or Soil and Dirt Accumulation

TECHNICAL SPECIFICATIONS

1.04 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.
- B. Manufacturer's Data:
 - 1. Complete materials list of all items proposed to be furnished and installed under this Section.
 - 2. Manufacturers' specifications and other data required to demonstrate compliance with the specified requirements.
 - 3. For information only, submit two copies of the manufacturers' specifications, including paint label analysis and application instructions for each material specified. Transmit a copy of each manufacturer's instructions to the applicator.
 - 4. Submit Material Safety and Data Sheet for all the materials to be used in this section.
- C. Shop Drawings:
 - 1. Provide shop drawings listing the manufacturer's product numbers in the same format as the Schedule listed in Part 2 - Products.
- D. Testing:
 - 1. Owner may request a testing of the paint thickness to verify the number of coats applied.
 - 2. Tests shall be performed by an Independent Laboratory and paid for by the Owner.
 - 3. If the test results show inadequate coverage, the Contractor shall promptly make the corrective work. Contractor shall reimburse the Owner for tests showing noncompliance per the requirements for Change Orders in the General Conditions.
- E. Samples:
 - 1. Provide two Samples of each color and each gloss for each material on which the finish is specified to be applied.
 - 2. Except as otherwise directed by the Architect, Samples shall be approximately 12" square.

1.05 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.

TECHNICAL SPECIFICATIONS

1.06 DELIVERY AND STORAGE

- A. Deliver all materials to the job site in original, new, and unopened containers bearing the manufacturer's name and label showing the following information:
 - 1. Name or title of material.
 - 2. Fed. Spec. number, if applicable.
 - 3. Manufacturer's stock number.
 - 4. Manufacturer's name.
 - 5. Contents by volume for major constituents.
 - 6. Thinning instructions.
 - 7. Application instructions.
- B. Storage of Materials: Provide proper storage to prevent damage to; and deterioration of, paint materials.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Definitions: The term "paint", as used herein, means all coating system materials including primers, emulsions, epoxy, enamels, sealers, fillers, and other applied materials whether used as prime, intermediate, or finish coats.

2.02 PAINT MATERIALS

- A. Acceptable Manufacturers:
 - 1. ICI Dulux Paint
 - 2. Sherwin Williams
 - 3. Benjamin Moore
 - 4. Kelly Moore
 - 5. Olympic Stain
 - 6. Approved equal.
- B. Provide the paint products, primers and intermediate coats for the appropriate substrate listed in the Paint Schedule.

TECHNICAL SPECIFICATIONS

1. Colors: Architect will issue a Color Schedule following award of the Contract. The Architect will select colors from the manufacturer's complete range of colors (including some "deep" and "intense" colors) to be used in the various types of paint specified. The Architect shall not be limited in his selection of colors and no change in the Contract Sum will be considered based on the Architect's color selections.

- a. Matching Colors: The Contractor shall match the existing colors where indicated on the Drawings.

C. Undercoats:

1. Provide undercoat paint produced and recommended by the same manufacturer as the finish coat.

D. Thinners:

1. Use only the thinners recommended by the paint manufacturer, and use only to the recommended limits.

2.03 CONCRETE SEALER

A. Acceptable Manufacturers:

1. Thoro
2. Paul M. Wolff, Co.
3. 3M
4. Chem-Trete
5. Approved Equal

- B. Provide a clear, penetrating water repellent for the appropriate substrate.

2.04 CONCRETE HARDENER

A. Acceptable Manufacturers:

1. Lapidolith
2. Euclid
3. Approved equal.

- B. Provide a hardener made up of a combination of magnesium and/or zinc fluosilicate.

TECHNICAL SPECIFICATIONS

2.05 APPLICATION EQUIPMENT

- A. For application of the approved paint, use only such equipment as is recommended for application of the particular paint by the manufacturer.
- B. Compatibility: Prior to actual use of application equipment, use all means necessary to verify that the proposed equipment is actually compatible with the material to be applied and that the integrity of the finish will not be jeopardized by use of the proposed application equipment.

2.06 OTHER MATERIALS

- A. All other materials, not specifically described but required for a complete and proper installation of the work of this Section, shall be as selected by the Contractor subject to the approval of the Architect.

2.07 PAINT SCHEDULE

- A. The following manufacturers are listed in the Paint Schedule:
 - 1. Paint: ICI Dulux Paints
 - 2. Sealer: Thoro
 - 3. Hardener: Lapidolith
- B. Other acceptable manufacturers, or others approved in advance by the Architect, may also be used.
- C. The Contractor shall be responsible for providing products of equal quality to those specified in the Paint Schedule when utilizing a different approved manufacturer.
- D. Provide number of coats required on Schedule. Back rolling is not considered a coat.

	SUBSTRATE	FINISH	TYPE	FINISHING SCHEDULE
E. EXTERIOR ARCHITECTURAL METAL				
1.	Shop Primed Ferrous Metal	Semi-Gloss	Alkyd Accent Colors	1 coat 4160 Devguard Metal Primer 2 coats 4348 VOC Industrial Enamel
2.	Galvanized and Aluminum Metals	Semi-Gloss	Alkyd Accent Colors	1 coat 4120 Devguard Galvanized Primer 2 coats 4348 VOC Industrial Enamel
F. INTERIOR WALLS & CEILINGS				
1.	Interior Walls: Concrete, Smooth and Textured, Drywall, Unglazed Brick	Semi-Gloss	Acrylic Latex	1 coat 1030 PVA Sealer 2 coats 1416 Ultra-Hide Latex

TECHNICAL SPECIFICATIONS

	SUBSTRATE	FINISH	TYPE	FINISHING SCHEDULE
2.	Woodwork: Wood Paneling, Wood Trim, Doors, Cabinets, etc.	Clear Satin	Polyurethane	1 coat 1902 Woodpride Satin (Thinned 20%) 2 coats 1902 Woodpride Satin
G. INTERIOR ARCHITECTURAL METALS				
1.	Unprimed Ferrous Metal	Semi-Gloss	Acrylic Latex	1 coat 4160 Devguard Metal Primer 2 coats 1406 Dulux Acrylic Enamel
2.	Shop Primed Ferrous Metal	Semi-Gloss	Acrylic Latex	1 coat 4160 Devguard Metal Primer 2 coats 1406 Dulux Acrylic Enamel
3.	Galvanized Metal and Aluminum	Semi-Gloss	Acrylic Latex	Clean and/or etch as necessary 1 coat 4120 Galvanized Metal Primer 2 coats 1407 Dulux Acrylic Enamel
H. MACHINERY, EQUIPMENT & FIXTURES				
1.	Bare Metal	Gloss	Two Component Polyamide Epoxy	1 coat 4170 Devran Epoxy Primer 2 coats 4508 Tru-Glaze Epoxy
2.	Shop Primed	Gloss	Modified Alkyd	1 or 2 coats 4348 Low VOC Industrial Enamel
I. EPOXY COATINGS				
1.	Drywall	Semi-Gloss	Two Component Polyamide Epoxy	1 coat 3210 Gripper Primer 2 coats 440X Tru-Glaze Epoxy
2.	Metal, including Equipment & Fixtures	Semi-Gloss	Two Component Polyamide Epoxy	1 coat 4170 Devguard Metal Primer 2 coats 4508 Tru-Glaze Epoxy

PART 3 - EXECUTION

3.01 JOB CONDITIONS

- A. Surface Temperatures: Do not apply paints when the temperature of surfaces to be painted and the surrounding air temperatures are below 50 degrees F, unless otherwise permitted by the manufacturer's printed instructions.
- B. Weather Conditions: Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85%; or to damp or wet surfaces; unless otherwise permitted by the manufacturer's printed instructions.

TECHNICAL SPECIFICATIONS

3.02 INSPECTION

- A. Prior to installation of the work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence. Verify that painting may be completed in strict accordance with the original design and with the manufacturers' recommendations.
- B. Discrepancies: Do not proceed in areas of discrepancy until all such discrepancies have been fully resolved.

3.03 COORDINATION

- A. Review other Sections of these Specifications as required, verifying the prime coats to be used and ensuring compatibility of the total coating system for the various substrata.
- B. Notify the Architect in writing of anticipated problems in using the specified coating systems over prime-coating supplied under other Sections.
- C. Provide finish coats which are compatible with the prime coats used.
- D. Upon request, furnish information on the characteristics of the specific finish materials to ensure that compatible prime coats are used.
- E. Schedule the cleaning and painting so that dust and other contaminants from the cleaning process will not fall onto wet newly painted surfaces.

3.04 SURFACE PREPARATION

- A. General:
 - 1. Contractor shall thoroughly prepare the surfaces for the application of paint. Prepare the surfaces as required by the manufacturer prior to the application of paint.
 - 2. All surfaces to be coated must be clean, dry, and free of all dirt, dust, oil, grease, or any contamination which would adversely affect the adhesion, protective properties, or performance of the paint.
- B. Masonry:
 - 1. Allow sufficient time for curing and drying of the masonry. A minimum of 30 days is recommended.
 - 2. Remove loose mortar and masonry.
 - 3. Repair cracks and defects using a suitable concrete and masonry patch.
 - 4. Clean thoroughly, patch as necessary, and fill.

TECHNICAL SPECIFICATIONS

5. Efflorescence: Surfaces composed of mortar and block will frequently develop efflorescence. Remove efflorescence from the face of block and mortar lines by wire brushing. For large areas, removal by washing with muriatic acid and thorough water flushing is recommended.
6. Existing mildew must be killed and removed prior to painting. Wash the affected areas with a 3:1 solution of water and chlorine bleach or a reliable commercial mildewcide until all discoloration is removed; rinse thoroughly and allow to dry.

C. Concrete:

1. Allow sufficient time for curing and drying of the concrete. A minimum of 30 days is recommended. Moisture content should not exceed 8%.
2. Concrete Form Release: Remove oil type of concrete form release by scrubbing with a strong solution of hot water and detergent followed by thorough flushing with clean water. If other types of form release have been used, removal by other methods may be required. Form release prevents good bond between concrete and paint.
3. Efflorescence: Surfaces of concrete will frequently develop efflorescence. Remove efflorescence from the face of the concrete lines by wire brushing. For large areas, removal by washing with muriatic acid and thorough water flushing is recommended.
4. Patch minor cracks with a reliable concrete or masonry patch.
5. Repair major defects with concrete prior to painting.

D. Plaster:

1. Allow sufficient time for curing and drying of the plaster. A minimum of 30 days is recommended. Paint should not be applied if the moisture content exceeds 8% as determined by a reliable moisture meter.
2. Wipe new plaster before priming to remove the fine powder that is left on the surface during trowelling and wet brush.
3. Remove dirt and dust as may be caused by other trades.
4. Fill cracks and holes with patching plaster.

E. Wood:

1. Where appropriate, rough grain should be sanded prior to priming.
2. Spot prime knots with recommended primer.
3. Putty and caulking should be applied after the first coat of primer. The first coat of primer will raise the grain somewhat.

TECHNICAL SPECIFICATIONS

4. Exterior wood siding, wood flooring and decking shall be back primed.
5. Surfaces such as doors, which must be very smooth, should be sanded lightly before the finish coat is applied.

F. Ferrous Metals:

1. Where practical and for top performance, sandblasting to white metal is recommended. For less severe exposures or where sandblasting is not practical, remove rust and mill scale by chipping, scraping, wire brushing or sanding.
2. Wipe new metal or metals exposed to grease and oil with lacquer thinner. (Do not use turpentine or mineral spirits as these solvents leave an oily residue.)
3. Since metal corrodes rapidly when exposed to both oxygen and moisture, PRIME IMMEDIATELY AFTER CLEANING!

G. Galvanized Metal:

1. New galvanized metal should be washed and etched with a suitable, commercially available phosphoric acid etching compound, rinsed with water and allowed to dry.
2. Unpainted rust free, galvanized metal weathered for at least six months needs to be wire brushed to remove "white rust".
3. Since metal corrodes rapidly when exposed to both oxygen and moisture, PRIME IMMEDIATELY AFTER CLEANING!
4. Etching is recommended to remove the clear hard coating used as temporary protection on some types of galvanized metal.

H. Aluminum:

1. New aluminum is often supplied with a hard wax or grease coating or with an adhesive-backed paper overlay for temporary protection. Any remnant of either left on the substrate will interfere with the primers adhesion or corrosion protection.
2. Weathered and/or oxidized aluminum should be washed and etched with a suitable, commercially available etching compound.

I. Gypsum Wallboard:

1. Remove the dust created by the sanding of tape joints by wiping with a damp cloth.
2. Fill all nail holes, cracks and minor defects with spackle.

TECHNICAL SPECIFICATIONS

J. Concrete Floors:

1. Prior to application of any coating, remove the laitance, the thin layer of fine cement powder, by acid etching.

3.05 EXISTING PAINTED SURFACES PREPARATION

A. General:

1. Contractor shall thoroughly prepare existing painted surfaces for application of new paint. Prepare surfaces as required by the manufacturer prior to the application of new paint.
2. Contractor shall immediately notify the Architect in writing if the Contractor feels that existing surface conditions will not adequately receive new finishes.
3. Remove all loose and peeling paint.
4. Sand hard or glossy areas dull.
5. Clean thoroughly, removing all dust, dirt, oxidation (chalk), oils, grease, wax, etc.
6. Utilize a latex emulsion condition for use over existing latex or oil type finishes on exterior surfaces to help provide a good bond over adhering chalk, resulting from paint erosion on previously painted surfaces.

B. Masonry:

1. Block filler: When the existing paint is not glossy or slick, powdery or chalky, and has left an "open surface" with sufficient voids and texture to ensure proper adhesion, the surface should be filled. Clean thoroughly, patch as necessary and fill with block filler using less material than typical on new work.
2. Efflorescence: Remove efflorescence from the face of block and mortar lines by wire brushing. For large areas, removal by washing with muriatic acid and thorough water flushing is recommended.
 - a. Contractor may utilize a "light" sandblast to remove efflorescence.

C. Concrete:

1. Patch minor cracks with a reliable concrete or masonry patch.
2. Major defects should be repaired with concrete prior to painting.
3. Efflorescence: Remove efflorescence from the face of the concrete lines by wire brushing. For large areas, removal by washing with muriatic acid and thorough water flushing is recommended.
 - a. Contractor may utilize a "light" sandblast to remove efflorescence.

TECHNICAL SPECIFICATIONS

D. Plaster:

1. Patch cracks and damaged spots with a water mix or latex type patching plaster. Thoroughly dampen the surrounding edges so that moisture is not absorbed from the patch mixture, leaving it crumbly and unsound to receive paint.

E. Exterior Wood:

1. Existing mildew must be killed and removed prior to painting. Wash the affected area with 3:1 solution of chlorine bleach or a reliable commercial mildewcide until all discoloration is removed; rinse, and allow to dry.
2. Spot prime rust stains and similar water activated stains.

F. Architectural Metal:

1. Spot prime any rusted areas with a rust block primer.
2. Spot prime rust stains and similar water activated stains.
3. If severe peeling exists, remove all traces of the existing paint to bare metal. Prepare the bare metal as required for a new surface.

G. Gypsum Wallboard:

1. If washed, rinse thoroughly, and allow to dry.
2. Fill cracks, holes and gouges with Spackle.
3. Spot prime water stains, smoke stains, crayon marks, and bleeding stains.
4. Flat surfaces in good condition can be painted directly.
5. Enameled or gloss surfaces should be sanded dull and primed.

3.06 PREPARATION

- A. Remove all detachable items which are in place and are not scheduled to receive paint finish. Or provide surface-applied protection prior to surface preparation and painting operations.
- B. Prepare each surface for paint as specified herein and as recommended by the manufacturer.
- C. Mix and prepare all materials before application to produce a mixture of uniform density, and as required during the application of materials. Do not stir into the materials any film which may form on the surface. Remove the film and, if necessary, strain the materials before using.

TECHNICAL SPECIFICATIONS

3.07 PAINTING

- A. Do not apply if the air or surface temperature is below 50 degrees F. Do not apply in wet weather or if the surface is damp.
- B. Apply by spray, roller or brush as recommended by the manufacturer for the paint specified for the applicable substrate.
- C. Apply at a rate recommended by the manufacturer for the paint specified for the applicable substrate.
- D. Thin to achieve the application characteristics desired by the painter within the manufacturer's recommendation.
- E. Do not paint over any required labels or equipment identification, performance rating, name, or nomenclature plates.
- F. Priming of Previously Painted Surfaces:
 - 1. Previously Painted Surfaces in good condition do not require priming. If in poor condition, prepare the surface as specified and recommended by the manufacturer; prime bare spots as indicated for unpainted surfaces and then apply a full prime coat.
 - 2. Where possible, tint primer toward finish coat.
- G. Provide barrier coats over non-compatible primers or remove and reprime as required.
- H. Provide back priming where required for wood substrate.
- I. Allow the appropriate drying time prior to recoating. Do not recoat before thoroughly dry.
- J. Sand and dust between enamel coats to remove all defects.
- K. Exterior Applications:
 - 1. Primer: Apply a full wet coat. Avoid voids or holidays. Efflorescence may come through even minute voids.
 - 2. Care should be taken to avoid hitting other buildings, cars, landscaping, etc. with overspray.
- L. Interior Applications:
 - 1. Provide adequate ventilation.
 - 2. Do not roll surfaces such as doors, shelves, cabinets, etc. which require perfectly smooth surfaces.

TECHNICAL SPECIFICATIONS

3. Apply epoxy paint in "Wet Areas" such as toilet rooms, showers, kitchens and janitor's closets.

M. Touch-Up Painting:

1. Contractor shall provide touch-up painting as required.
2. The patch shall blend in with the surrounding area. If the touch-up work is distinguishable from the surrounding surface, Architect may require that the entire wall be repainted.

3.08 CLEANING AND PROTECTION

- A. Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to the Architect.
- B. Provide "Wet Paint" signs as required to protect newly-painted finishes.
- C. During the progress of the work, remove from the site all discarded paint materials, rubbish, cans and rags at the end of each work day.
- D. Clean-up: Clean splatters and tools immediately with the appropriate materials. Dispose of paint and thinner soaked rags carefully to avoid combustion.
- E. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.
- F. At the completion of work of other trades, touch-up and restore all damage or defaced painted surfaces.
- G. Upon completion of painting work, clean window glass and other paint- spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage the glass surface.
- H. Following completion of painting in each space or area, reinstall the removed items by using workmen skilled in the necessary trades.

3.09 EXTRA MATERIAL

- A. Amount: Upon completion of the work of this Section, deliver to the Owner an extra stock equaling 5%, but not less than one gallon in unopened containers, of each color, type, and gloss of paint used in the work.
- B. Deliver to a location as directed by the Owner, and obtain signature from the Owner indicating receipt.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 09970 FIBERGLASS REINFORCED PANELS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide all fiberglass reinforced panels where shown on the Drawings, as specified herein, and needed for a complete and proper installation.
- B. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.

1.02 QUALITY ASSURANCE

- A. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.03 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.
- B. Manufacturer's Data:
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Submit manufacturer's specifications and other data needed to prove compliance with the specified requirements.
 - 3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.04 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect materials of this section before, during, and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 WALL PANELS

- A. Acceptable Manufacturers:

TECHNICAL SPECIFICATIONS

1. "Fire-X Glasbord" as manufactured by Crane Composites, Inc..

2. Approved equal.

B. Where "fiberglass panels" or similar terms are shown on the Drawings, provide .09" thick white fiberglass reinforced plastic sheet with trim.

2.02 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Installation: Securely install the approved products in accordance with the manufacturer's recommendations as approved by the Architect, setting panels straight, plumb, level and true to the lines and levels shown on the Drawings.

B. Finish butt joints, wall juncture, wall/ceiling and wall/curb joints with the specified sealant, tooling to a smooth finish.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 10100 MARKERBOARDS AND TACKBOARDS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide all markerboards and tackboards, complete, in place, as shown on the Drawings, specified herein, and needed for a complete and proper installation.
- B. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.

1.02 QUALITY ASSURANCE

- A. Qualifications of Installers: Use skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.03 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.
- B. Manufacturers' Data:
 - 1. Complete materials list of all items proposed to be furnished and installed under this Section
 - 2. Manufacturers' specifications and other data required to demonstrate compliance with the specified requirements.
- C. Shop Drawings
 - 1. Provide shop drawings for each type of chalkboard and tackboard units showing components, arrangements, dimensions, orientation on walls, sections of trim members, dimensioned elevations, grounds, reinforcements, and accessories.
- D. Samples
 - 1. Provide one (1) sample for each type and color of chalkboard and tackboard base materials, face materials, materials colors, accessories, and trim.

1.04 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect installed work and materials of all other trades.

TECHNICAL SPECIFICATIONS

- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.05 DELIVERY AND STORAGE

- A. Deliver factory-built markerboards and tackboards as units completely assembled in one piece without joints, whenever possible. When overall dimensions require delivery in separate units, prefit at factory, disassemble for delivery, and make final joint at site.

PART 2 - PRODUCTS

2.01 MARKERBOARDS

- A. Acceptable Manufacturers:

1. Claridge.
2. Lemco.
3. Tri-Adco.
4. Approved equal.

- B. Markerboard panels shall be 24 gauge LCS face with 3/8" Duracore core and .002" aluminum foil panel backing. Claridge No. 24 LCS-116-F.

1. Size: 4' x 8' single piece.
2. Color: To be selected by the Architect.

- C. Markerboard trim shall incorporate map rail at top and chalk tray at bottom. supply angle hangers and anchors to facilitate concealed mounting to wall. Provide 2 map hooks per 4 lineal feet of markerboard.

2.02 TACKBOARD

- A. Acceptable Manufacturers

1. Claridge.
2. Lemco.
3. Tri-Adco.
4. Approved equal.

- B. Tackboard panels shall be 1.27 cm (1/2") thick and consist of 6 mm (1/4") cork cemented to hardboard.

TECHNICAL SPECIFICATIONS

1. Size: 4' x 4'
2. Color: To be selected by the Architect.

C. Tackboard end trim shall be coordinated with that of the markerboard.

2.03 OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install boards in locations and at mounting heights as shown on the Drawings, and in accordance with the manufacturer's instructions. Provide all grounds, brackets, anchors, trim, and accessories for a complete installation.
- B. Provide shims and/or blocking at chalkboard back to eliminate deflection.

3.03 CLEANING AND PROTECTION

- A. Protect installed boards from any possible damage that may be caused by other trades.
- B. Thoroughly clean the boards prior to acceptance by the Owner.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 10162 METAL TOILET PARTITIONS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide all metal toilet partitions and urinal screens, complete, in place, as shown on the drawings, specified herein, and needed for a complete and proper installation.
- B. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.
- C. Related Work:
 - 1. Section 05400: Lightgauge Metal Framing
 - 2. Section 06100: Rough Carpentry
 - 3. Section 10800: Toilet & Bath Accessories

1.02 QUALITY ASSURANCE

- A. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.03 REFERENCE STANDARDS

- A. Americans with Disabilities Act: 2010 ADAAG.
- B. American National Standards Institute: ANSI A117.1-2009 - Providing Accessibility and Usability for Handicapped People.

1.04 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.
- B. Manufacturer's Data:
 - 1. Complete materials list of all items proposed to be furnished and installed under this Section.
 - 2. Manufacturer's specifications and other data required to demonstrate compliance with specified requirements.
- C. Shop Drawings:

TECHNICAL SPECIFICATIONS

1. Shop drawings and sufficient dimensional data to enable proper coordination of installation of concealed items of support.

1.05 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 TOILET PARTITIONS

- A. Acceptable Manufacturers:
 1. Global
 2. Sanymetal
 3. Republic
 4. Accurate Partitions Corp., Fresno, California
 5. Approved Equal.
- B. Steel Sheets for Powder Coated Finish: ASTM A591, Class C. Bonderized- Galvanized, of the following minimums.
 1. Mounting: Floor anchor/overhead braced.
 2. Doors: 1" thick, 2 sheets 22 ga.
 3. Panels: 1" thick, 2 sheets 22 ga.
 4. Pilasters: 1 1/4" thick, 2 sheets 22 ga.
 5. Plinth: 3" high polished stainless steel (18-8 type 304SS).
 6. Hardware: Manufacturer's standard design - chrome finish.
- C. Color: As selected by the Architect from the manufacturer's "complete" range of colors. The Architect shall not be limited in his selection to the "standard" range of colors.

TECHNICAL SPECIFICATIONS

2.02 URINAL SCREENS

- A. Acceptable Manufacturers:
 - 1. Global
 - 2. Sanymetal
 - 3. Republic
 - 4. Approved Equal.
- B. Screen shall be floor to ceiling post supported with a 1-3/4" thick post. Screen shall be 20 ga. electro-galvanized bonderized steel.
- C. Steel sheets ASTM A591, Class C.
- D. Color: As selected by the Architect from the manufacturer's "complete" range of colors. The Architect shall not be limited in his selection to the "standard" range of colors.

2.03 OTHER MATERIALS

- A. Provide other materials, not specifically described, but required for a complete and proper installation as selected by the Contractor subject to approval by the Architect.

PART 3 - EXECUTION

3.01 FABRICATION

- A. Fabricate in strict accordance with the manufacturer's product data.

3.02 PREPARATION

- A. Coordination: Properly coordinate with all other trades as required to ensure adequate provisions for anchorage of the work of this Section and for proper interface with work of all other trades.

3.03 INSPECTION

- A. Examine the areas and conditions under which work of this Section will be installed. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3.04 INSTALLATION

- A. Install the work of this section straight and plumb within a tolerance of one in 200 horizontally and one in 500 vertically, rigidly anchoring into position for long life under hard use.

TECHNICAL SPECIFICATIONS

- B. Perform all drilling and cutting for installation of anchors only at locations which will be concealed in the finished work.
- C. Provide a uniform vertical edge clearance for doors of approximately 5 mm (3/16"), resting open at approximately 30 degrees when the latch is not engaged.
- D. Adjust operating components for optimum smooth function.

3.05 PROTECTION AND CLEANING

- A. Protect installed metal toilet partitions and urinal screens from any possible damage that may be caused by other trades.
- B. Thoroughly clean the metal toilet partitions and urinal screens prior to acceptance by the Owner.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 10400 IDENTIFYING DEVICES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide all identifying devices complete, in place, as shown on the drawings, specified herein and as needed for a complete and proper installation.
- B. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.
- C. Related Work:
 - 1. Section 09900: Painting

1.02 QUALITY ASSURANCE

- A. Qualifications of Manufacturer: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items.
- B. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

1.03 REFERENCE STANDARDS

- A. Manual of Uniform Traffic Control Devices
- B. Americans with Disabilities Act: ADA.
- C. American National Standards Institute: ANSI A117.1-2009 - Providing Accessibility and Usability for Handicapped People.

1.04 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.
- B. Manufacturer's Data:
 - 1. Complete materials list of all items proposed to be furnished and installed under this Section.
 - 2. Manufacturers' specifications and other data required to demonstrate compliance with the specified requirements.

TECHNICAL SPECIFICATIONS

3. Manufacturer's recommended installation procedures.

C. Shop Drawings:

1. Shop drawings showing all details of fabrication and anchorage.
2. Contractor shall coordinate the final signage characters with the Architect and Owner prior to the shop drawing submittal. A schedule indicating the approved characters shall be included as part of the shop drawings.

D. Samples:

1. Provide one sample showing colors, profiles, joining, and finish.

1.05 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect materials of this section before, during, and after installation and to protect installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the architect and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 CORRIDOR SIGN SYSTEM

A. Acceptable Manufacturers:

1. ANDCO Industries Corp.
2. ASI Sign Systems
3. Best Manufacturing Co.
4. Approved equal.

B. 1/8" acrylic with 1/32" raised acrylic letters and symbols with Braille per ADA and ANSI A117.1 requirements.

1. Mounting: Mechanical Mounting
2. Letter Style: Helvetica Medium
3. Size: As indicated in the drawings
4. Color: As selected by the Architect from the manufacturer's "complete" range of colors. The Architect shall not be limited in his selection to the "standard" range of colors.

TECHNICAL SPECIFICATIONS

2.02 OTHER MATERIALS

- A. All other materials not specifically described, but required for a complete and proper installation shall be as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 FABRICATION

- A. Fabricate in strict accordance with the approved shop drawings and the original design, except where specifically otherwise approved by the Architect.

3.02 INSPECTION

- A. Examine the areas and conditions under which work of this section will be installed. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3.03 INSTALLATION

- A. At all times during progress of the work, coordinate as required with all other trades to ensure proper and adequate provision in the work of other trades for interface with the work required under this section.
- B. Comply with all applicable recommendations of the ADA and ANSI Specification A117.1.
- C. Install the work of this section in strict accordance with the original design and the approved shop drawings, except as specifically otherwise approved by the Architect. Anchor all components firmly into position, in the true alignment horizontally and vertically within a tolerance of one in 1000.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 10500 WARDROBE LOCKERS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide wardrobe lockers where shown on the drawings, as specified herein, and as needed for a complete and proper installation.
- B. Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.
- C. Work Related:
 - 1. Section 09260: Gypsum Wallboard System

1.02 QUALITY ASSURANCE

- A. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.03 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.
- B. Manufacturer's Data:
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
 - 3. Manufacturer's recommended installation procedure which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the work.

1.04 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect materials of this Section before, during and after installation and to protect installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

TECHNICAL SPECIFICATIONS

PART 2 - PRODUCTS

2.01 WARDROBE LOCKERS

A. Acceptable Manufacturers:

1. Lyon Metal Products, Inc.
2. Republic Storage Systems Co., Inc.
3. Medart.
4. Approved equal.

B. Lockers are to be heavy duty fully ventilated steel construction with full length door strike. All welded construction.

1. Locker Units: 12 inches wide x 21 inches deep x 72 inches high overall; single tier.
2. Color: As selected by the Architect from the manufacturer's "complete" range of colors. The Architect shall not be limited in his selection to the "standard" range of colors.
3. 5% of lockers shall be handicap accessible.

C. Materials shall be sheet steel: ASTM A446; commercial grade, stretcher levelled, galvanized of the following minimum thickness.

1. Body and Shelf: 16 gauge.
2. Base, Top, Trim: 16 gauge.
3. Doors: 14 gauge.
4. Backs: 18 gauge.
5. Filler Panels: 16 gauge.
6. Sloping Hoods: 16 gauge.

D. Bodies shall be formed and flagged with stiffener ribs and electrically welded.

E. Door Frame: 16 gauge angle shape, welded to body and ground flush.

F. Doors: 1-1/8 inch minimum thickness, angle reinforced top and bottom, inner face with stiffening rib, inner and outer face welded with three welded hinges for full height doors, two hinges for other doors, recessed locking handle. Weld hinges to door frame.

G. Provide metal number plates.

TECHNICAL SPECIFICATIONS

H. Ventilation:

1. Doors shall have extra full perforated ventilation openings for full height of door.
2. Tops, sides, back and bottoms will not be ventilated.

I. Finish edges smooth without burrs.

J. Prepare locking handle for padlock. Locking device shall be supplied by Owner.

K. Finishing: Clean, degrease and neutralize. Follow with a prime coat and two finish coats of baked enamel.

L. Provide for each single tier locker, one shelf.

M. Provide one coat double prong ceiling hook per locker and three single prong hooks.

N. Continuous sloping hood to be provided at all lockers.

2.02 OTHER MATERIALS

- A. All other materials, not specifically described, but required for a complete and proper installation shall be as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which work of this Section will be installed. Correct conditions detrimental to proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Take site dimensions affecting this work.
- B. Ensure that base recesses are properly sized and located.

3.03 INSTALLATION

- A. Install the lockers in strict accordance with the manufacturer's written instructions.
- B. Install lockers secure, plumb, square, and in line.
- C. Anchor lockers to wall with anchor devices. Two fasteners required for every two lockers. Anchors must be secured to solid backing. Expansion type anchors into gypsum board are unacceptable.
- D. Bolt or weld adjoining locker units together to provide rigid installation.

TECHNICAL SPECIFICATIONS

- E. Install metal end panels and filler panels to close off openings.
- F. Provide and install sloped metal hood and end fillers.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 10520 FIRE EXTINGUISHERS AND CABINETS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide Fire Extinguishers and Cabinets where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
- C. Related Work:
 - 1. Section 09900: Painting.

1.02 QUALITY ASSURANCE

- A. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.03 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.
- B. Manufacturer's Data:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
 - 3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.
- C. Shop Drawings:
 - 1. Dimensioned drawings as needed to depict the space required for these items, and their interface with the work of other trades.

1.04 REFERENCE STANDARDS

- A. National Fire Protection Association - NFPA 10 Portable Fire Extinguishers.

TECHNICAL SPECIFICATIONS

1.05 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the work and materials of this section before, during and after installation and to protect the work and materials of all other trades.
- B. Replacement: In the event of damage, immediately make all repairs and replacements necessary and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 CABINETS

- A. Acceptable Manufacturers:
 - 1. Larsens Manufacturing Co.
 - 2. Potter - Roemer.
 - 3. Approved equal.
- B. Provide fire extinguisher cabinets with the following attributes:
 - 1. Size: As required for fire extinguisher.
 - 2. Door Material: Aluminum, 1/2" thick with clear satin anodized finish.
 - 3. Door Style: Vertical Duo with Larsen-Loc.
 - 4. Mounting: Surface.
 - 5. Rim Projection: Rolled Edge
 - 6. Options:
 - a. Die Cut Lettering; Fire Handle.
 - b. Glass: Clear tempered safety glass.

2.02 FIRE EXTINGUISHERS

- A. Acceptable Manufacturers:
 - 1. Larsens Manufacturing Co.
 - 2. Potter - Roemer.
 - 3. Approved equal.

TECHNICAL SPECIFICATIONS

- B. At each fire extinguisher cabinet, provide one 5 lb. multipurpose chemical fire extinguisher with UL rating of 2A-10B:C.
- C. At each fire extinguisher hanger, provide on 5 lb. Multipurpose chemical fire extinguisher with UL rating of 3-A:40-B:C (at Work Bays).

2.03 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- B. Install the work of this Section in strict accordance with the original design, the reviewed Shop Drawings, pertinent requirements of governmental agencies having jurisdiction, and the Manufacturer's recommended installation procedures, anchoring all components firmly into position for long life under hard use.
- C. Service, charge, and tag each fire extinguisher not more than five calendar days prior to the Date of Substantial Completion of the Work as that Date is established by the Architect.

3.03 CLEANING AND PROTECTION

- A. In addition to other stipulated requirements for cleaning, completely remove finger prints and traces of soil from surfaces of exposed portions, using only those cleaning materials recommended for the purpose by the manufacturer of the material being cleaned.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 10800 TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide all toilet room accessories, complete, in place, as shown on the drawings, specified herein, and needed for a complete and proper installation.
- B. Documents affecting work of this section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.
- C. Related Work:
 - 1. Section 10162: Metal Toilet Partitions.

1.02 QUALITY ASSURANCE

- A. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.03 REFERENCE STANDARDS

- A. Americans with Disabilities Act: ADA.
- B. American National Standards Institute: ANSI A117.1-2009 - Providing Accessibility and Usability for Handicapped People.

1.04 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.
- B. Manufacturer's Data:
 - 1. Complete materials list showing all items proposed to be furnished and installed under this section.
 - 2. Manufacturer's specifications and other data required to demonstrate compliance with specified requirements.
 - 3. Manufacturer's recommended methods of installation.

TECHNICAL SPECIFICATIONS

1.05 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the owner.

PART 2 - PRODUCTS

2.01 TOILET AND BATH ACCESSORIES

- A. Acceptable Manufacturers:
 - 1. Bobrick
 - 2. Approved equal.
- B. Anchors and Fasteners: Provide anchors and fasteners capable of developing a retaining force commensurate with the strength of the accessory to be mounted, and well suited for use with the supporting construction. Where exposed fasteners are permitted, provide oval head fasteners with finish matching the accessory.
- C. Finish: All accessory items shall be stainless steel with satin finish.
- D. Refer to the equipment list on the drawings for the toilet accessories.
- E. Design is based on use of products manufactured by the Bobrick Company, Contura Series, and catalog numbers of that manufacturer are given as an indication of the quality and style required.
 - 1. Grab Bar: B-5806 x 36"
 - 2. Grab Bar: B-5806 x 48"
 - 3. Toilet Seat Cover Dispenser: B-4221 Contura Series
 - 4. Toilet Paper Dispenser: B-288 Contura Series
 - 5. Sanitary Napkin Disposal: B-270 Contura Series
 - 6. Mirrors: B-290-2436
 - 7. Soap Dispenser: B-826
 - 8. Paper Towel/Waste Receptacle - Semi-Recessed: B-43944 Contura Series

TECHNICAL SPECIFICATIONS

- F. Typical Construction for Contura Series: Material thickness 22 gauge, seamless stainless steel, with all welded construction, continuous piano hinges welded to doors and cabinets. Stainless steel cable door-swing limiter, keyed tumbler locks.

2.02 OTHER MATERIALS

- A. Provide other materials, not specifically described, but required for a complete and proper installation as selected by the Contractor subject to approval by the Architect.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which work of this section will be installed. Correct conditions detrimental to proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Throughout construction of substrate surfaces, use all means necessary to ensure proper and adequate provisions for concealed support devices, and for finished openings, to receive the work of this section.
- B. Install all Toilet and Bath Accessories in accordance with the ADA and ANSI Specification A117.1-2009.
- C. Install the work of this section in strict accordance with the manufacturer's recommendations as approved by the Architect, anchoring all components plumb, level, square, and firmly into position for long life under hard use.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 10999 MISCELLANEOUS SPECIALTIES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide all Miscellaneous Specialties complete, in place, as shown on the Drawings and specified herein or as required for a complete and proper installation.
- B. Documents affecting work of this section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.

1.02 QUALITY ASSURANCE

- A. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.03 SUBMITTALS

- A. Submit the following submittals in accordance with the requirements in the General Conditions.
- B. Manufacturer's Data:
 - 1. The manufacturer's recommended installation procedures, when approved by the Architect, will become the basis for inspecting and accepting or rejecting actual installation procedures used on the Work.
 - 2. Complete materials list of all items proposed to be furnished and installed under this Section.
 - 3. Manufacturers' specifications and other data required to demonstrate compliance with the specified requirements.
 - 4. Manufacturer's recommended installation procedures.
- C. Shop Drawings:
 - 1. Provide Shop Drawings showing all details of fabrication, anchorage, erection, and interface with the work of other Sections.
 - 2. Provide a separate submittal for each individual specialty.

TECHNICAL SPECIFICATIONS

D. Samples:

1. Provide one (1) sample of proposed specialties, showing profiles, joining, and finish if requested by the Architect.
2. Provide the complete range of colors available for each miscellaneous specialty where applicable.

1.04 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 ACCESS PANELS

A. Acceptable Manufacturers:

1. Milcor.
2. Larsens.
3. Karp.
4. William Brothers.
5. Approved equal.

B. Provide plumbing chase access doors for the following installations:

1. Masonry: 16" x 32", Security Access Doors; 10 ga. steel door panel with baked on primer; detention dead bolt keyed to the master system; tamper proof screws; masonry anchors.
2. Drywall:
 - a. Wall Installation: 16" x 16"; Flush Panel Access Door for Drywall Applications; 14 ga. steel door panel with baked on primer; cylinder lock.
 - b. Ceiling Installation: 24" x 36"; Flush Panel Access Door for Drywall Applications; 14 ga. steel door panel with baked on primer; cylinder lock.
3. Insulated, 16" x 32", Fire Rated Access Door; 20 ga. steel door panel, with baked on primer; mortise cylinder keyed to the master system. Masonry anchors where applicable. Insulation 1-15/16" rockwool insulation sandwiched between inner and outer panels.

TECHNICAL SPECIFICATIONS

2.02 SNOW RETENTION

- A. Acceptable Manufacturers:
 - 1. Color Gard
 - 2. Approved equal.
- B. S-5 Snorail System with SNOCLIP111.

2.03 STAINLESS STEEL CORNER GUARDS

- A. Acceptable Manufacturers:
 - 1. Bobrick
 - 2. Approved equal.
- B. Size: Type 304, 18 ga. stainless steel, satin finish, 4" x 4" x 54"

2.04 EXPANSION JOINT COVERS

- A. Acceptable Manufacturers:
 - 1. Balco, Inc.
 - 2. Approved equal.
- B. Wall Expansion Cover: Model No. TCWW-8.
- C. Floor Expansion Joint Cover: Model No. EXB-8.

2.05 OTHER MATERIALS

- A. All other materials not specifically described but required for a complete and proper installation shall be as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 FABRICATION

- A. Fabricate in strict accordance with the approved Shop Drawings and the original design, except where specifically otherwise approved by the Architect.

3.02 INSPECTION

- A. Examine the areas and conditions under which work of this Section will be installed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

TECHNICAL SPECIFICATIONS

3.03 INSTALLATION

- A. At all times during progress of the Work, coordinate as required with all other trades to ensure proper and adequate provision in the work of other trades for interface with the work required under this Section.
- B. Install the work of this Section in strict accordance with the original design and the approved Shop Drawings, except as specifically otherwise approved by the Architect.
- C. Anchor all components firmly into position, in true alignment horizontally and vertically within a tolerance of one in 1000 or as recommended by the manufacturer.
- D. Adjust operating components for optimum smooth function

3.04 CLEANING AND PROTECTION

- A. Thoroughly clean all Miscellaneous Specialties prior to acceptance by the Owner.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 13120 PRE-ENGINEERED STEEL BUILDINGS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide on a performance level a Pre-Engineered Steel Building where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
1. The building structural system shall be rigid frame type situated to fit the buildings as shown.
 2. All work shall be of the manufacturer's standard design.
 3. The interior shall be free of columns except where specifically noted. The Contractor shall match the frame lines as shown on the drawings.
 4. The entirety of the buildings shall be covered with pre-finished metal roof and wall panels. Submit working drawings for the buildings, including reactions to the foundation.
- B. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 01 of these Specifications.
- C. Related Work:
1. Section 03200: Concrete Reinforcement
 2. Section 03300: Cast-in-Place Concrete
 3. Section 07221: Metal Building Roof/Wall Insulation System
 4. Section 07900: Sealants & Caulking
 5. Section 08100: Metal Doors & Frames
 6. Section 08361: Insulated Steel Sectional Doors
 7. Section 08710: Finish Hardware

1.02 QUALITY ASSURANCE

- A. The intent of these Specifications is to establish a quality and performance level for structural design, material, durability and workmanship.
- B. The Contractor must conform strictly to these Specifications.
- C. The building shall be the design of a manufacturer who is regularly engaged in the fabrication of Pre-Engineered Steel Buildings with related experience of a minimum of 3 years.

TECHNICAL SPECIFICATIONS

- D. All materials shall be new, unused, free from defect and of American manufacture.
- E. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- F. The roof and wall construction shall carry an Underwriters' Laboratories construction (uplift) rating of not less than Class 90.

1.03 REFERENCE STANDARDS

- A. American Institute of Steel Construction "Manual of Steel Construction".
- B. American Iron & Steel Institute "Specification for the Design of Cold-Formed Steel Structural Members".
- C. International Building Code, 2012 Edition.
- D. Federal, Military & Commercial Standards.
- E. American Society for Testing Materials - Applicable Standards.
- F. Underwriters' Laboratories.
- G. Factory Mutual Engineering Association.
- H. American Welding Society - "Structural Welding Code".
- I. American Society of Civil Engineers, ASCE 7-10.

1.04 SUBMITTALS

- A. Within 20 calendar days of award of the Contract, submit the minimum number of copies indicated in Section 01500.
- B. Manufacturer's Data:
 - 1. Provide verification and certification that the pre-engineered steel building supplied for this project was manufactured and fabricated so as to comply with "Buy America" requirements.
 - 2. Provide complete erection drawings showing column and bracing reactions, frame drifts, columns, anchor bolt setting, sidewall, endwall and roof framing, transverse cross-sections, covering and flashing details, and necessary installation details to clearly indicate the proper assembly of all building parts. All openings for doors, windows, etc., shall be clearly detailed, shown and dimensioned. These drawings shall be sufficient for Building Permit requirements and Architectural and structural engineer review.

TECHNICAL SPECIFICATIONS

3. Complete structural analysis calculations of the building sealed by a Structural or Civil Engineer registered in the State of Nevada shall be submitted by the metal building manufacturer to the Architect before beginning construction.

C. Samples:

1. Provide one sample of the metal panel colors and style of both roofing panel and siding panel. The Architect shall not be limited in his selection to only the "Standard" range of colors.
2. Provide one sample of the selected panel color when requested by the Architect.

D. Certification:

1. The Contractor must submit a letter from the building manufacturer certifying that the building proposed will be furnished to meet or exceed all the design load criteria and that all structural design will be in strict conformance with that prescribed in the 2012 International Building Code and ASCE 7-10, and the additional requirements shown on the Plans and Specifications. Reduced wind or seismic load criteria developed from the Metal Building Manufacturer's Association "Recommended Design Practices Manual", will not be allowed.

E. Guarantee:

1. Provide a copy of the guarantee accompanying the shop drawings, clearly stating the conditions of the guarantee.
2. Durability of the roof panels due to rupture, structural failure or perforation shall be guaranteed for a period of 20 years by the building manufacturer.
4. The color, baked on finish, for the wall panels shall be guaranteed by the building manufacturer for twenty (20) years against blistering, peeling, cracking, flaking, checking and chipping.
5. Provide a 20 year guarantee against excessive color change.
6. Provide a 20 year guarantee against chalking. Chalking shall not be less than a rating of 8 per ASTM D-659.

1.05 DESIGN LOADS

A. Basic Design Loads:

1. The basic design loads shall include live, collateral, lateral, wind, and earthquake, in addition to dead load. All other design loads, whether they be of static, dynamic or kinetic nature, shall be considered as auxiliary loads.

B. Vertical Live Loads:

1. Purlins shall be designed for 21 psf (snow) uniformly distributed over the roof area which they support.

TECHNICAL SPECIFICATIONS

2. Primary framing (frames) shall be designed for 21 psf (snow) uniformly distributed over the roof area which it supports.
3. All the above loads to be in addition to the applicable structure dead loads, plus an additional 10 psf collateral load, and shall be applied to the horizontal projection of the roof.

C. Wind Loads:

1. The wind load on the structure shall be as per the requirements of the International Building Code, 2012 Edition. The design wind velocity shall be 130 mph (exposure C). Wind load design shall comply with the requirements shown in ASCE 7-10.
2. When the wind load is applied in such a direction that it is not resisted by the transverse rigid frames, provision shall be made to adequately transmit all wind forces on the building to the foundation. These provisions may consist of:
 - a. Diagonal bracing, such that the forces are carried by truss action. The bracing may consist of rods with threaded end anchors.
 - b. Portal frames.

D. Seismic Loads:

1. The seismic load on the structure shall be as per the requirements of the International Building Code, 2012 Edition, and ASCE 7-10, for the specific site location.

E. Combination of Dead Loads:

1. The combining of normal loads and auxiliary loads for design purposes shall be as prescribed and recommended by the Metal Building Manufacturer's Association "Design Practices Manual" of most recent issue, 2012 IBC, and ASCE 7-10.

F. Lateral Drift:

1. The maximum lateral drift of the main building frame shall be 0.005 times the highest eave height for wind or seismic design.

G. Wind Uplift Rating:

1. The roof and wall construction shall be designed for and have the proper connections to carry an Underwriter's Laboratories construction (uplift) rating of not less than I-90.

H. Metal Building

1. Metal building shall be designed to support present and future design loads for vertical and lateral support of the future expansions.

1.06 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect materials of this Section before, during and after installation and to protect installed work and materials of all other trades.

TECHNICAL SPECIFICATIONS

- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.07 WARRANTY

- A. Special Warranty on Metal Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Finish Warranty Period: 20 years from date of Substantial Completion.
- B. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that leak or otherwise fail to remain weathertight within specified warranty period.
 - 1. Warrant Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. American Building
 - 2. Behlen Mfg. Co.
 - 3. Butler Manufacturing Company; a BlueScope Steel company.
 - 4. Nucor Building Systems.
 - 5. Vulcan Steel Structures, Inc.

2.02 MATERIALS: All materials for this project shall comply with "Buy America" requirements.

- A. Steel:
 - 1. Hot Rolled Structural Shapes: ASTM A-36 or A-529.
 - 2. Tubing or Pipe: ASTM A-500, Grade B; ASTM A-501; or ASTM A-53.
HSS Vertical guardrail posts shall be ASTM A500 Grade B, Fy = 42 ksi.
 - 3. Members Fabricated from Plate or Bar Stock: 42,000 psi minimum yield strength, ASTM A-529, A-570, or A-572.
 - 4. Members Fabricated by Cold Forming: ASTM A-607, Grade 50.

TECHNICAL SPECIFICATIONS

5. Galvanized Steel Sheet: ASTM A-446 with G90 coating - "Class" to suit building manufacturer's standards. Minimum yield stress to be 80,000 psi.
7. Rigid Frames: Fabricate from hot-rolled structural steel. Provide factory welded and shop painted built-up "I" shape or open rigid frame consisting of tapered or parallel flange beams and parallel columns. Furnish complete with attachment plates, bearing plates, and splice members. Factory drilled for bolted field assembly.
8. End Wall Columns: Provide factory welded, built-up "I" shape or cold-formed sections, shop painted.
9. Wind Bracing: Provide adjustable, threaded steel rods, 1/2" diameter minimum, ASTM A-36 or A-572, Grade D. Approved cable may be used in lieu of steel rods. Cable bracing shall be 7 strand zinc coated steel wire conforming to ASTM A-475, extra high strength.
10. Secondary Framing: Purlins, girts, eave struts, end wall beams, flange and sag bracing; minimum 16 gauge rolled formed sections. Shop painted.
11. Bolts: ASTM A-306 or A-325 as necessary for design loads and connection details. Shop painted, except provide zinc or cadmium plated units when direct contact with panels.
12. Welds: Welds are designed to meet the stress requirements of the AWS "Structural Welding Code", D1.1-79.
13. Structural Steel Primer: To meet Federal Specification TT-P-636D.

2.03 METAL ROOF PANELS

- A. Long Span III Roof Panels per American Building: Formed with ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels.
 1. Material: Zinc-coated (galvanized) steel sheet, 0.028-inch nominal thickness.
 - a. Exterior Finish: Three-coat fluoropolymer.
 - b. Color: Light Stone.
 2. Clips: Manufacturer's standard sheet.
 3. Joint Type: Panels snapped together.
 4. Joint Type: Mechanically seamed folded according to manufacturer's standard.
 5. Panel Coverage: 36 inches.
 6. Panel Height: 1-1/4" inches.
 7. Uplift Rating: UL 90.
 8. All joints and end laps shall be sealed with non-hardening sealant.

TECHNICAL SPECIFICATIONS

2.04 ROOF PURLINS

- A. The purlin's configuration, thickness and spacing shall be the Building Manufacturer's Standard provided all design criteria, including deflecting and fire rating, are met or exceeded.
- B. Based on a simple span, the deflection of the purlin shall not exceed $L/240$ of its span when supporting the applied vertical live loads previously prescribed and any lateral loads required.

2.05 SKYLIGHTS

- A. Roof skylight panels shall be translucent fiberglass reinforced, gel coated, polyester panels made in the same configuration as the metal panels. They shall be manufactured with a 2 ounce woven fiberglass cloth reinforcement in addition to random strand mat or cut glass fibers (40% min. glass percent by weight) for structural strength. They shall meet or exceed applicable requirements of ASTM D3841-80 Type 1, and ICBO Research Report No. 1412. Material weight shall not be less than 8 ounces per square foot. Impact Test: Skylights shall resist penetration when subject to a 100 pound cylindrical weight with a 5-3/4" diameter (26 square inches) dropped from a height of 70". Flammability rate of material shall be no greater than 2 in/min when tested under ASTM D635. Coefficient of heat transmission (U-factors) shall be no greater than 0.8 BTU/Hr/sf degree F. Available insulated skylights shall have a light transmitting foam sandwiched between a standard weight exterior panel and a 4 ounce nominal weight interior panel. Skylight panels shall be equivalent to STRONGLIGHT panels as manufactured by Crane Composites or equal.

2.06 METAL WALL PANELS

- A. Long Span III Metal Wall Panels per American Building: Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.
 - 1. Material: Zinc-coated (galvanized) steel sheet, 0.028-inch nominal thickness.
 - a. Exterior Finish: Three-coat fluoropolymer.
 - b. Color: Light Stone.
 - 2. Major-Rib Spacing: 12 inches o.c.
 - 3. Panel Coverage: 36 inches.
 - 4. Panel Height: 1-1/4 inches.
- B. Based on a simple span, the deflection of the wall panel shall not exceed $L/180$ of its span when supporting the applicable design load previously prescribed.

2.07 WALL GIRTS

- A. The girts' configuration and thickness shall be the building manufacturer's standard provided all design criteria, including deflection and girt spacing is met.

TECHNICAL SPECIFICATIONS

- B. Based on a simple span, the deflection of the girts (supporting the wall covering) shall not exceed $L/240$ of its span when supporting the applicable design load previously described.

2.08 INSULATION

- A. Insulation shall be suitable for application to walls and roof of steel buildings.
- B. Insulation shall be spray foam roof and wall insulation (38.7) with fire retardant coating.

2.09 GUTTERS AND DOWNSPOUTS

- A. All eave gutters and downspouts shall be of the Manufacturer's standard design. Joint sealant shall be used to insure weather tightness. Gutters and downspouts shall be supported with approved hangers and/or metal compatible with gutters and downspouts.
 - 1. Color to be Light Stone.
- B. Downspouts to have 45 degree elbows at the bottom with splash blocks.

2.10 FLASHING, TRIM, CLOSURES AND RAKE

- A. Flashing and/or trim shall be furnished at the rake, corners and eaves, at framed openings, and wherever else necessary to provide weather tightness and a finished appearance.
- B. Flashing, metal closures, trim and other miscellaneous parts shall be fabricated from lock-forming quality galvanized steel.
- C. Closure material, either formed metal or solid or closed cell closure strip, is to be installed along the rake and/or eave where required for weather tightness.

2.11 SHEET PANEL FASTENERS

- A. Manufacturer's standard system of self-tapping screws, (Type A or Type AB threads) bolts and nuts, self-locking rivets, self-locking bolts, end-welded studs, and other suitable fasteners designed to withstand design loads.
- B. Provide metal backed neoprene washers under heads of fasteners bearing on weather side of panels.
- C. Where required by the Architect, the fastener heads shall be color coated to match the roof or wall panels.

2.12 FLEXIBLE CLOSURE STRIPS

- A. Closed-cell, expanded cellular rubber, self extinguishing, cut or pre-molded to match corrugation configuration of roofing and siding sheets.

TECHNICAL SPECIFICATIONS

2.13 SEALING TAPE

- A. 100% solid, pressure sensitive grey polyisobutylene compound tape with release paper backing. Not less than 1/2" wide and 1/8" thick, non-sag, non-toxic, non-staining and permanently elastic.

2.14 JOINT SEALANT

- A. As recommended by Building Manufacturer.

2.15 OVERHEAD DOOR FRAMED OPENINGS

- A. All overhead door framed openings shall be cold-formed channels designed to meet the loads as specified.
- B. Opening to be completely trimmed so that no primed steel is exposed to exterior.

2.16 PERSONNEL DOORS

- A. Provide metal doors and frames of the types and styles indicated on the drawings or schedules. Doors and frames shall meet standards set forth in previous Section 08100 - Metal Doors and Frames.
- B. Personnel door frames shall be non-handed frames, of knock down type for field assembly through bolted connections.
- C. Doors and frames shall be provided by the steel building manufacturer and be installed with sheet metal trim at all doors to flash around door frame and provide a finished appearance.

2.17 HORIZONTAL SLIDING WINDOWS

- A. Aluminum windows shall be single slide (horizontal), self-framing type with pre-glazed hermetically sealed insulating glass (clear). Windows shall be provided as per drawings or schedules and detailed as per standard designs of the Pre-Engineered Steel Building Manufacturer.

2.18 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

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3.02 FABRICATION

A. Structural Steel Primer:

1. All un-coated structural steel shall be given one (1) shop coat of rust inhibitive (primer) paint which meets or exceeds Federal Specifications TT-P-636D, or certification shall be submitted that it conforms to a recognized authoritative specification, such as from a Federal or Military authority or the Structural Steel Painting Council. Welds or defects shall be field painted.

3.03 ERECTION

A. The erection of the metal shall be in accordance with the approved erection drawings and shall be by a qualified erector using proper tools and equipment. Erection practices shall conform to AISC.

1. There shall be no field modifications to primary structural members except as authorized by the Engineer and the building manufacturer in writing.

B. Flange Bracing:

1. The inside flanges of rigid frame columns and rafters shall be braced laterally by angles connected to the frame and to the web of the purlins or girts, as required by the compressive bending stress induced by the loadings.

C. Field Painting:

1. Abrasions caused by handling after painting shall be touched up.
2. Welds or defects shall be field painted.

D. Roof Panels:

1. Roof panels shall be fastened to the purlins with stainless steel or aluminum weather-sealed type screws, bolts, rivets, or with special clips. Fasteners shall be adequately spaced to develop the uplift requirements prescribed. Minimum fastener size shall be 9/32" and shall be capable of a clamping force of 250 pounds, but not greater than 525 pounds. Roof fasteners shall remain watertight under a 6" head of water for a 30 minute period and have a neoprene washer.

E. Roof openings:

1. Openings, 12" or smaller, may be flashed and sealed to the roof panel, provided complete structural support and weathertightness is maintained.
2. Openings, larger than 12", round or square, shall be framed with a welded metal base fabrication from 22 gauge galvanized sheet metal. A vacuum molded base of acrylic polyvinyl chloride shall also be considered adequate in lieu of metal. The base and its appurtenance shall be supported by the roof purlins and/or header framing (if required). The base shall have a minimum projection of 6" above the weather surface of the roof, and the configuration of the flanges shall match the roof panel. The flange to panel joint

TECHNICAL SPECIFICATIONS

shall be sealed with a non-hardening sealant and fastened in such a manner as to provide complete support and weathertightness.

3. All roof penetrations shall be flashed and sealed to a weathertight condition by the roofer on the project.

F. Wall Panels:

1. The wall panel shall be fastened to its supports with sheet metal screws of case hardened steel with zinc coating or chromate finish. Fasteners shall be adequately spaced to develop the wind force requirements prescribed. Minimum washer diameter shall be 11/16" and shall be furnished with neoprene backing which shall have minimum diameter of 11/16". Exposed stainless steel or aluminum screws, bolts, and/or rivets shall be acceptable for securing trim, fascias, gutters and miscellaneous flashings to either the wall or roof panels. Wall fasteners and trim fasteners shall have factory applied color finish or field applied color cap which matches wall panel color.
2. The top, bottom and intermediate panel closures, flashings, fascias, gutters and trim shall be the building manufacturer's standard, compatible with the material furnished as wall panels.

G. Insulation:

1. Provide the wall/roof Insulation system, and place per the requirements found in Specification Section 07221.

END OF SECTION 13120

TECHNICAL SPECIFICATIONS

SECTION 13850 FIRE ALARM SYSTEM

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes fire alarm control panels, manual fire alarm stations, automatic smoke, heat detectors and fire alarm signaling appliances, and auxiliary fire alarm equipment and power and signal wire and cable.
- B. All equipment and components shall be the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protected premises protective signaling (fire alarm) system. The authorized representative of the manufacturer of the major equipment, such as control panels, shall be responsible for the satisfactory installation of the complete system.
- C. The contractor shall provide, from the acceptable manufacturer current product lines, equipment and components, which comply, with the requirements of these specifications. Equipment or components, which do not provide the performance and features, required by these specifications are not acceptable, regardless of manufacturer.
- D. Fire alarm system shall integrate with existing security system by Desert Hills Security, Reno.

1.02 RELATED SECTIONS

- A. Section 15300 – Fire Protection devices.
- B. Section 16060 – Grounding and Bonding for Electrical Systems.
- C. Section 16123 – Building Wire and Cable.

1.03 REFERENCES

- A. National Fire Protection Association (NFPA):
 - 1. NFPA 12 – Standard on Carbon Dioxide Extinguishing Systems.
 - 2. NFPA 13 – Installation of Sprinkler Systems.
 - 3. NFPA 15 – Standard for Water Spray Fixed Systems for Fire Protection.
 - 4. NFPA 16 – Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems.
 - 5. NFPA 16A – Standard for the Installation of Closed Head Foam-Water Sprinkler Systems.
 - 6. NFPA 70 – National Electrical Code (NEC).

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7. NFPA 72 – National Fire Alarm Code.
 8. NFPA 90A – Standard for the Installation of Air Conditioning and Ventilating Systems.
 9. NFPA 101 – Life Safety Code.
 10. NFPA 750 – Standard on Water Mist Fire Protection Systems.
 11. NFPA 5000 – Building Construction and Safety Code.
- B. Underwriters Laboratories (UL):
1. UL 268 – Standard for Smoke Detectors for Fire Alarm Signaling Systems.
 2. UL 864 – Standard for Control Units and Accessories for Fire Alarm Systems.
 3. UL 268A – Standard for Smoke Detectors for Duct Applications.
 4. UL 217 – Standard for Single and Multiple Station Smoke Alarms.
 5. UL 521 – Standard for Heat Detectors for Fire Protective Signaling Systems.
 6. UL 228 – Door Closers-Holders, With or Without Integral Smoke Detectors.
 7. UL464 – Audible Signaling Appliances.
 8. UL 346 - Waterflow Indicators for Fire Protective Signaling Systems.
 9. UL 1971 – Standard for Signaling Devices for the Hearing Impaired.
 10. UL 1481 - Power Supplies for Fire Protective Signaling Systems.
 11. UL 1635 - Digital Alarm Communicator System Units

1.04 SYSTEM DESCRIPTION

- A. This section of the specification includes the furnishing, installation, connection and testing of the microprocessor controlled, intelligent reporting fire alarm equipment required to form a complete, operative, coordinated system. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, Fire Alarm Control Panel (FACP), power supplies, auxiliary control devices, annunciators, and wiring as shown on the drawings and specified herein.
1. The fire alarm system shall comply with requirements of NFPA Standard 72 for Protected Premises Signaling Systems except as modified and supplemented by this specification. The system shall be electrically supervised and monitor the integrity of all conductors.
 2. The fire alarm system shall be manufactured by an ISO 9001 certified company and meet the requirements of BS EN9001: ANSI/ASQC Q9001-1994.
 3. The FACP and peripheral devices shall be manufactured 100% by a single U.S. manufacturer (or division thereof).
 4. The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and the installation shall be in compliance with the UL listing.
 5. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site to guide the final checkout and to ensure the systems integrity.

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6. A new intelligent reporting, microprocessor-controlled fire detection and notification system shall be installed in accordance with the specifications and as indicated on the Drawings.
7. Each Signaling Line Circuit (SLC) and Notification Appliance Circuit (NAC): Limited to only 80 percent of its total capacity during initial installation.
8. Control Panel shall be expandable, as necessary, to accommodate future expansion

B. Basic Performance:

1. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded on NFPA Style 4 (Class B) Signaling Line Circuits (SLC).
2. Initiation Device Circuits (IDC) shall be wired Class A (NFPA Style D) as part of an addressable device connected by the SLC Circuit.
3. Notification Appliance Circuits (NAC) shall be wired Class A (NFPA Style Z) as part of an addressable device connected by the SLC Circuit.
4. On Style 6 or 7 (Class A) configurations a single ground fault or open circuit on the system Signaling Line Circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.
5. Alarm signals arriving at the FACP shall not be lost following a primary power failure (or outage) until the alarm signal is processed and recorded.
6. NAC speaker circuits shall be arranged such that there is a minimum of one speaker circuit per floor of the building or smoke zone, whichever is greater.
7. Audio amplifiers and tone generating equipment shall be electrically supervised for normal and abnormal conditions.
8. NAC speaker circuits and control equipment shall be arranged such that loss of any one (1) speaker circuit will not cause the loss of any other speaker circuit in the system.
9. Two-way telephone communication circuits shall be supervised for open and short circuit conditions.

C. Basic System Functional Operation

When a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:

1. The system alarm LED on the system display shall flash.
2. A local piezo electric signal in the control panel shall sound.
3. A backlit LCD display shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.
4. Printing and history storage equipment shall log the information associated each new fire alarm control panel condition, along with time and date of occurrence.
5. All system output programs assigned via control-by-event interlock programming to be activated by the particular point in alarm shall be executed, and the associated system outputs (notification appliances and/or relays) shall be activated.

D. Sequence of Operations

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1. Audio: Upon alarm activation of any area smoke detector, heat detector, manual pull station, and sprinkler waterflow, the following functions shall automatically occur:
 - a. The internal audible device shall sound at the control panel or command center.
 - b. Display the alarm event on the graphical workstation.
 - c. The LCD Display shall indicate all applicable information associated with the alarm condition including: zone, device type, device location and time/date.
 - d. All system activity/events shall be documented on the system printer.
 - e. Any remote or local annunciator LCD/LED's associated with the alarm zone shall be illuminated.
 - f. The following audio messages and actions shall occur simultaneously:
 - 1) An evacuation message shall be sounded on fire floors (zones) immediately above and below (adjacent to) the fire floor (zone) <general alarm evacuation>. It is the intent of this message to advise occupants hearing this message that they are near danger and should leave the building via the stairs (nearest exit) immediately.
2. Visual: Activate visual strobes. The visual strobe shall continue to flash until the system has been reset. The visual strobe shall not stop operating when the "Alarm Silence" is pressed.
 - a. Activate visual strobes on the fire floors <zones> immediately above and below (adjacent to) the fire floor (zone) <general alarm evacuation>. The visual strobe shall continue to flash until the system has been reset. The visual strobe shall not stop operating when the "Alarm Silence" is pressed.
 - b. An alert message shall be sounded on the remainder of building. It is the intent of this message to advise occupants to prepare for evacuation if necessary. An instructional message shall be sounded in the stairwells instructing occupants to move carefully and quickly down the stairs to exit the building and to exit to a safe floor if you encounter smoke in the stairwell.
 - c. An instructional message shall be sounded in the elevator cabs. It is the intent of this message to advise elevator occupants that an emergency exists, the elevator has been directed to the ground floor, and that occupants should quickly exit the building.
 - d. An instructional message shall be sounded in the lobby. It is the intent of this message to advise lobby occupants to leave the lobby and clear the area for arriving firefighters.
 - e. An instructional message shall be sounded in the concourses connected to the building's lobby. It is the intent of this message to prevent new entries into the lobby by advising occupants not to attempt to enter the lobby of the affected building.
 - f. Provide selective paging to each individual floor (zone). In addition to the message/channels detailed above, a dedicated page channel shall be capable of simultaneously providing live voice instructions without interrupting any of the messages listed above shall be provided.

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- g. Transmit signal to the building automation system.
 - h. Transmit signal to the central station with point identification.
 - i. Activate automatic smoke control sequences.
 - j. All automatic events programmed to the alarm point shall be executed and the associated outputs activated.
 - k. All stairwell/exit doors shall unlock throughout the building.
 - l. All self-closing fire/smoke doors held open shall be released.
3. Duct Smoke Activation – (Supervisory) The activation of any duct smoke detector, the following functions shall automatically occur:
- a. The internal audible device shall sound at the control panel or command center.
 - b. Display the event on the graphical workstation and display a pictorial image.
 - c. The LCD display shall indicate all applicable information associated with the condition including; zone, device type, device location and time/date.
 - d. All system activity/events shall be documented on the system printer.
 - e. Transmit signals to remote or local annunciator LED's.
 - f. Transmit signal to the building automation system.
 - g. Transmit signal to the central station with point identification.
 - h. Shutdown the local air handling unit.
 - i. All automatic events programmed to the alarm point shall be executed and the associated outputs activated.
4. Supervisory Operation
- a. Upon supervisory activation of any sprinkler valve supervisory switch, fire pump off-normal, clean agent fire suppression system trouble, the following functions shall automatically occur:
 - b. The internal audible device shall sound at the control panel or command center.
 - c. Display the event on the graphical workstation and display a pictorial image.
 - d. The LCD display shall indicate all applicable information associated with the supervisory condition including; zone, device type, device location and time/date.
 - e. All system activity/events shall be documented on the system printer.
 - f. Any remote or local annunciator LCD/LED's associated with the supervisory zone shall be illuminated.
 - g. Transmit signal to the central station with point identification.
5. Trouble Operation
- a. Upon activation of a trouble condition or signal from any device on the system, the following functions shall automatically occur:
 - b. The internal audible device shall sound at the control panel or command center.
 - c. Display the event on the graphical workstation and display a pictorial image.
 - d. The LCD keypad display shall indicate all applicable information associated with the trouble condition including; zone, device type, device location and time/date.

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- e. All system activity/events shall be documented on the system printer.
 - f. Any remote or local annunciator LCD/LED's associated with the trouble zone shall be illuminated.
 - g. Transmit signal to the central station with point identification.
6. Monitor Activation
- a. Upon activation of any device connected to a monitor circuit, the following functions shall automatically occur:
 - b. The internal audible device shall sound at the control panel or command center.
 - c. Display the event on the graphical workstation and display a pictorial image.
 - d. The LCD display shall indicate all applicable information associated with the status condition including; zone, device type, device location and time/date.
 - e. All system activity/events shall be documented on the system printer.
 - f. Any remote or local annunciator LCD/LED's associated with the status zone shall be illuminated.
7. Graphic Workstation
- a. Graphic Workstation – Fire Graphic Workstation Functions
 - 1) All Events
 - a) Display the address of the alarm or off normal point with type and description and time of the event in a prioritized color-coded event list. Highlighting an event, in the event list, shall automatically cause the other three quadrants (described below) to display information relating to the highlighted event.
 - b) Display color graphical representation of the area in which the alarm or off normal device is located. It shall be possible for the operator to manually zoom down to any portion of a vector-based graphic without aliasing, artifacting, or pixilation of the image. Preset zoom levels shall not be considered equal.
 - c) Display a set of written operator instructions for each event, site programmability of the message must be provided allowing modification by the end user to suit occupancies and emergency plans. The Workstation must provide simple control via a two button mouse.
 - d) Display a preset stored image of the device
 - e) Log operator's comments for each event to history with time and date.
 - f) Log all events and operator actions to history for future review.
 - 2) Fire alarms
 - a) Shall be capable of acknowledging, silencing, and resetting fire alarm functions.

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- b) Shall be capable of manually activating, deactivating, enabling, and disabling individual fire alarm points.
 - c) Shall be capable of generating status, maintenance and sensitivity reports for all fire alarm components.
 - d) Receipt of a fire alarm shall activate an audio WAV file over the workstation speakers alerting the operator to a fire alarm, and providing audible instructions.
- 3) Maintenance and Control Functions
- a) Control capability
 - b) Reports: status, sensitivity.

1.05 SUBMITTALS

- A. General Conditions: Submittal Procedures.
- B. Include sufficient information, clearly presented, to determine compliance with the specifications and the Drawings.
- C. Equipment Submittals:
 - 1. Cover Page: Indicate the following:
 - a. Project name and address.
 - b. Engineered systems distributor's name and other contact information.
 - c. Installing contractor's name and other contact information.
 - d. Date of equipment submittals. Indicate on revised submittals the original submittal date and revised submittal date.
 - 2. Table of Contents: Lists each section of equipment submittal.
 - 3. Scope of Work Narrative: Detail indented scope of work.
 - 4. Bill of Material: Indicate for each component of system the following:
 - a. Quantity.
 - b. Model number.
 - c. Description.
 - 5. Highlight, underline, etc, equipment being specified.
 - 6. SLC Circuit Schedule: Detail address and associated description of each addressable device. Clearly provide information that indicates number of both active and spare addresses.
 - 7. Battery Calculations: Show load of each of, and total of, components of system along with standby and alarm times that calculations are based on. Show calculated spare capacity and size of intended battery.
 - 8. Voltage Calculations: Supply Voltage drops for each notification appliance circuit, either in submittal or on drawings.
- D. Shop Drawings:
 - 1. Cover Page: Indicate the following:
 - a. Project name and address.
 - b. Engineered systems distributor's name and other contact information.

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- c. Installing contractor's name and other contact information.
 - d. Date of equipment submittals. Indicate on revised submittals the original submittal date and revised submittal date.
2. Floor Plans:
- a. Provide separate sheet for each floor.
 - b. If a floor plan must be split using match lines to fit on the page, provide match lines and match line references that refer to sheet number that shows area on opposite side of match line.
 - c. Prepare using AutoCAD.
 - d. Prepare to scale 1/8 inch = 1'-0", unless otherwise required by the Architect or Engineer.
 - e. Show equipment and device locations.
 - f. Show wiring information in point-to-point format.
 - g. Include oneline diagram showing all devices and circuiting as laid out on floor plan.
 - h. (Existing Systems) Show all existing devices and tie in of new devices to existing system.
3. Title Block: Provide on each sheet and include, at a minimum, the following:
- a. Project name.
 - b. Project address.
 - c. Sheet name.
 - d. Sheet number.
 - e. Scale of drawing.
 - f. Date of drawing.
 - g. Revision dates, if applicable.
4. Control Panel: Provide sheet that details exterior and interior views of control panel and clearly shows associated wiring information.
5. Annunciator Panels: Provide sheet that details exterior and interior views of annunciator panels and clearly shows associated wiring information.
6. Sequence of Operations: Use matrix detailing activation of each type of device and associated resulting activation of the following:
- a. Control panel.
 - b. Annunciator panels.
 - c. Smoke Detectors
 - d. Notification appliances.
 - e. Building fire safety functions, including elevator recall, elevator power shutdown, door lock release, door holder release, HVAC unit shutdown.
- E. Certification: Submit with equipment submittals and shop drawings, letter of certification from major equipment manufacturer, indicating proposed engineered system distributor is an authorized representative of major equipment manufacturer.
- F. Job Site Plans and Submittals: There shall be one set of original permitted drawings, submittals, and permit on the job site before any fire alarm installation can begin, this includes but is not limited to fire alarm back boxes. Coordinate with General Contractor. A copy of the permit shall be included with the operations and maintenance manuals once the job is completed.

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- G. Project Record Drawings:
 - 1. Submit complete project record drawings within 14 calendar days after acceptance test.
 - 2. Project record drawings shall be similar to shop drawings, but revised to reflect changes made during construction.

- H. Operation and Maintenance Manuals:
 - 1. Submit complete operation and maintenance manuals within 14 calendar days after acceptance test.
 - 2. Operation and maintenance manuals shall be similar to equipment submittals, but revised to reflect changes made during construction.
 - 3. Operations and maintenance manuals shall include copies of inspection and field testing reports, preliminary and final testing reports, and Certificate of Occupancy

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience and with service facilities within 100 miles of project.

- B. Installer shall be NICET Level II certified and registered with the State Fire Marshal.

- C. Submit a copy of the system supplier's training certification issued by the manufacturer of the integrated life safety system, and a copy of the installing technician's NICET certification.

- D. Designer shall be NICET Level II certified and a copy of the designer's NICET certification shall be submitted and their certification number shall be displayed on the drawings.

1.07 QUALITY ASSURANCE

- A. Codes and Standards:
 - 1. NFPA: System shall comply with the following NFPA codes and standards:
 - a. NFPA 12.
 - b. NFPA 13.
 - c. NFPA 15.
 - d. NFPA 16.
 - e. NFPA 16A.
 - f. NFPA 70.
 - g. NFPA 72.
 - h. NFPA 90A.
 - i. NFPA 101.
 - j. NFPA 750.
 - k. NFPA 5000.

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2. ADA: System shall conform to American with Disabilities Act (ADA).
- B. To ensure reliability and complete compatibility, all items of fire alarm system, including control panels, power supplies, initiating devices, and notification appliances, shall be listed by Underwriters Laboratories Inc. (UL) and shall bear "UL" label.
- C. Fire Alarm Control Panel Equipment: UL-listed under UL 864 Ninth Edition.
- D. The contractor shall have in-house engineering and project management capability consistent with the requirements of this project. Qualified and approved representatives of the system manufacturer shall perform the detailed engineering design of central and remote control equipment. Qualified and approved representatives of the system manufacturer shall produce all panel and equipment drawings and submittals, operating manuals. The contractor is responsible for retaining qualified and approved representative(s) of those system manufacturers specified for detailed system design and documentation, coordination of system installation requirements, and final system testing and commissioning in accordance with these specifications.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage: The owner will provide the Contractor with a lockable storage space for the Contractor's use during this project. Store materials in a clean dry indoor area and in accordance with manufacturer's instructions.
 1. In the event there is no overnight storage, materials brought to the job site shall be installed the same day. Contractor is responsible for the safe handling and storage of materials.
- C. Handling: Protect materials from damage during handling and installation.

1.09 COORDINATION

- A. Coordinate the Work of this section with the Work of other sections, including sprinkler systems as specified in Section 13930, 13950, elevators as specified in Section 14245, 14250, HVAC systems as specified in Section 15820, and security/door locking systems as specified in Section 08710.

1.10 WARRANTY

- A. Warranty Period for System Equipment: 1 year from date of final acceptance.

PART 2 PRODUCTS

2.01 MANUFACTURER

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- A. General Electric – Vigilante Series
- B. No equal will be accepted
- F. References to manufacturer's model numbers and other information is intended to establish minimum standards of performance, function, and quality.
- G. All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protective signaling system, meeting the National Fire Alarm Code.
- H. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.
- I. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.
- J. Substitute equipment proposed as equal to equipment specified shall meet or exceed requirements of this section.

2.02 CONDUIT AND WIRE

- A. Conduit:
 - 1. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements.
 - 2. Where required, all wiring shall be installed in conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.
 - 3. Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per NEC Article 760.
 - 4. Wiring for 24 volt DC control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.
 - 5. Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or back boxes, except where conduit entry is specified by the FACP manufacturer.
 - 6. Conduit shall be 3/4-inch (19.1 mm) minimum.
- B. Wire:
 - 1. All fire alarm system wiring shall be new.
 - 2. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended

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by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for Initiating Device Circuits, Signaling Line Circuits, and Notification Appliance Circuits.

3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.
 4. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NFPA 70 (e.g., FPLR).
 5. Wiring used for the multiplex communication circuit (SLC) shall be twisted and unshielded and support a minimum wiring distance of 12,500 feet. The design of the system shall permit use of IDC and NAC wiring in the same conduit with the SLC communication circuit.
 6. All field wiring shall be electrically supervised for open circuit and ground fault.
 7. The fire alarm control panel shall be capable of t-tapping Class B (NFPA Style 4) Signaling Line Circuits (SLCs). Although t-tapping will be allowed it shall be kept to a minimum.
- C. Terminal Boxes, Junction Boxes and Cabinets shall be UL listed for their use and purpose.
- D. Initiating circuits shall be arranged to serve like categories (manual, smoke, waterflow). Mixed category circuitry shall not be permitted except on signaling line circuits connected to intelligent reporting devices.
- E. The fire alarm control panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as FIRE ALARM. Fire alarm control panel primary power wiring shall be 12 AWG. The control panel cabinet shall be grounded securely to either a cold water pipe or grounding rod.

2.03 SYSTEM COMPONENTS

- A. Control Panel: Main FACP (or network node) shall be a modular type, analog/addressable, microprocessor based fire alarm panel designed specifically for fire alarm system. The control panel shall include all required hardware, software and site specific system programming to provide a complete and operational system.
1. The following shall apply:
 - a. Shall be capable of being front-panel programmed or by portable computer.
 - b. Individually supervised, panel mounted, power supply.
 - c. Backlit - LCD Display.
 - d. Support analog and addressable points plus 25% spare.
- B. System Cabinet:
1. Surface or semi-flush mounted.
 2. UL listed.
 3. Consists of back box, (inner door,) and door.
 4. Available in at least 3 sizes to best fit project configuration.

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5. The assembly shall contain a base panel, system power supply and battery charger with optional modules suitable to meet the requirements of these specifications.
- C. Power Supply Module: Use latest technologies to provide power to the Control Panel and incorporate the following features:
1. Power-saving switching technology using no step-down transformers.
 2. 9-amp continuous-rated output to supply up to all power necessary under normal and emergency conditions.
 3. Integral battery charger with capacity to charge up to 65 amp-hour batteries while under full load.
- D. Batteries:
1. Sufficient capacity to provide power for entire system upon loss of normal AC power for a minimum period of 24 hours and with a minimum of 5 minutes of alarm signaling at end of this 24-hour period, as required by NFPA 72 or AHJ requirements.
- E. LCD Display Module:
1. LCD Display: 80-character RS-485 based textual annunciator with capability of being mounted locally or remotely. Provide audible and visual annunciation of all alarms and trouble signals. Provide dedicated LEDs for:
 - a. AC Power On: Green.
 - b. Alarm: Red.
 - c. Supervisory: Yellow.
 - d. System Trouble: Yellow.
 - e. Power Fault: Yellow.
 - f. Ground Fault: Yellow.
 - g. System Silenced: Yellow.
 2. 80-Character Alphanumeric Display: Provide status of all analog/addressable sensors, monitor and control modules. Display shall be liquid crystal type (LCD), clearly visible in dark and under all light conditions.
 3. Panel shall contain 4 functional keys:
 - a. Alarm Acknowledge.
 - b. Trouble Acknowledge.
 - c. Signal Silence.
 - d. System Reset/Lamp Test.
 4. Panel shall contain 3 configuration buttons:
 - a. Menu/Back.
 - b. Back Space/Edit.
 - c. OK/Enter.
 5. Panel shall have 12-key telephone-style keypad to permit selection of functions.
- F. Signaling Line Circuit Module shall be of multiprocessor design to allow maximum flexibility of capabilities and operation. SLC Loop Interface shall be capable of mounting in stand-alone enclosure as specified.

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1. Field Programmable: System shall be capable of being programmed by Field Configuration Program (FCP), allowing programming to be downloaded via portable computer from any node on network.
2. RS-232C Serial Output: Supervised RS-232C serial port shall be provided to operate remote printers and/or video terminals, accept downloaded program from portable computer, or provide 80-column readout of all alarms, troubles, location descriptions, time, and date. Communication shall be standard ASCII code operating from 1,200 to 115,200 baud rate.
3. RS-485 Serial Output: Each SLC Module shall incorporate an RS-485 bus via ribbon harness for connection of modules inside same cabinet, and via 4-wire quick connector for connection of modules up to 3,000 feet from cabinet. Each SLC Module shall support at least 1 main annunciator and additional remote annunciators.
4. Peer-to-Peer Panel Configuration: All Loop Interface Modules shall incorporate own programming, log functions, Central Processor Unit, and control-by-event (CBE) programming. If any loop driver becomes disabled, each remaining loop driver shall continue to communicate with remainder of network and maintain normal operation.
5. Control-by-Event (CBE) Program: Shall be capable of programming using Boolean logic including AND, OR, NOT, and TIMING functions to provide complete programming flexibility.
6. Alarm Verification: Smoke detector alarm verification shall be standard option while allowing other devices such as manual stations and sprinkler flow to create immediate alarm. This feature shall be selectable for smoke sensors that are installed in environments prone to nuisance or unwanted alarms.
7. Alarm Signals: All alarm signals shall be automatically latched or "locked in" at control panel until operated device is returned to normal and control panel is manually reset. When used for sprinkler flow, "SIGNAL SILENCE" switch may be bypassed, if required by AHJ.
8. Electrically Supervised:
 - a. Each SLC and NAC circuit shall be electrically supervised for opens, shorts, and ground faults. Occurrence of fault shall activate system trouble circuitry, but shall not interfere with proper operation of other circuits.
 - b. Yellow "SYSTEM TROUBLE" LEDs shall light and system audible sounder shall steadily sound when trouble is detected in system. Failure of power, open or short circuits on SLC or NAC circuits, disarrangement in system wiring, failure of microprocessor or any identification module, or system ground faults shall activate this trouble circuit. Trouble signal shall be acknowledged by operating "TROUBLE ACKNOWLEDGE" switch. This shall silence sounder. If subsequent trouble conditions occur, trouble circuitry shall resound. During alarm, all trouble signals shall be suppressed with exception of lighting yellow "SYSTEM TROUBLE" LEDs.
9. Drift Compensation – Analog Smoke Sensors: System software shall automatically adjust each analog smoke sensor approximately once each week for changes in sensitivity due to effects of component aging or environment, including dust. Each sensor shall maintain its actual sensitivity under adverse conditions to respond to alarm conditions while

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- ignoring factors which generally contribute to nuisance alarms. System trouble circuitry shall activate, display units that requires maintenance.
10. Analog Smoke Sensor Test: System software shall automatically test each analog smoke sensor a minimum of 3 times daily. Test shall be recognized functional test of each photocell (analog photoelectric sensors) and ionization chamber (analog ionization sensors) as required annually by NFPA 72. Failure of sensor shall activate system trouble circuitry, display "Test Failed" indication, and identify individual device that failed.
 11. Off-Premises Connection:
Choose one of the following three paragraphs.
 - a. Fire Alarm System: Connect via leased telephone lines to central station or remote station.
 - b. Fire Alarm System: Connect to local energy city master box.
 - c. Fire Alarm System: Connect via Digital Alarm Communicator Transmitter (DACT) and telephone lines to central station or remote station. Panel shall contain disconnect switch to allow testing of system without notifying fire department.
 12. Remote Station Option: Fire department shall be consulted regarding authorized remote station serving municipality. Fire alarm system shall transmit alarm, supervisory, and trouble signals with alarm having priority over supervisory and trouble signals. Required phone lines shall be provided and installed between incoming telephone service and fire alarm system by Owner's telephone contractor under separate contract. Owner will be responsible for phone company costs.
 13. Network Annunciator Option: Options for annunciation shall default as regional annunciator with capability of selecting global annunciation to provide system-wide protection and Acknowledge, Silence, and Reset capabilities.
 14. Redundant History Log: Shall contain full 4100 event history log supporting local and network functions. If a main processor or network node is lost the entire log shall be accessible at any other Loop Interface board. This shall be demonstrated by removing power followed by extraction of history log from any loop driver location
 15. LEDs Indicator and Outputs: Each Loop Interface shall incorporate as a minimum the following diagnostic LED indicators:
 - a. Power: Green.
 - b. Alarm: Red.
 - c. Supervisory: Yellow.
 - d. General Trouble: Yellow.
 - e. Ground Fault: Yellow.
 - f. Transmit: Green.
 - g. Receive: Green.
 16. Auxiliary Power Outputs: Each Loop Interface shall provide the following supply outputs:
 - a. 24 VDC non-resettable, 1 amp. maximum, power limited.
 - b. 24 VDC resettable, 1 amp. maximum, power limited.
 17. Microprocessor: Loop interface shall incorporate 32-bit RISC processor. Isolated "watchdog" circuit shall monitor microprocessor and upon failure shall activate system trouble circuits on display. Microprocessor shall

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- access system program for all control-by-event (CBE) functions. System program shall not be lost upon failure of both primary and secondary power. Programming shall support Boolean logic including AND, OR, NOT, TIME DELAY functions for maximum flexibility.
18. Auto Programming: System shall provide for all SLC devices on any SLC loop to be pre-programmed into system. Upon activation of auto programming, only devices that are present shall activate. This allows for system to be commissioned in phases without need of additional downloads.
 19. Environmental Drift Compensation: System shall provide for setting Environmental Drift Compensation by device. When detector accumulates dust in chamber and reaches unacceptable level but yet still below allowed limit, control panel shall indicate maintenance alert warning. When detector accumulates dust in chamber above allowed limit, control panel shall indicate maintenance urgent warning.
 20. NON-FIRE Alarm Module Reporting: Non-reporting type ID shall be available for use for energy management or other non-fire situations. NON-FIRE point operation shall not affect control panel operation nor shall it display message at panel LDC. Activation of NON-FIRE point shall activate control by event logic, but shall not cause indication on control panel.
 21. 1-Man Walk Test:
 - a. System shall provide both basic and advanced walk test for testing entire fire alarm system. Basic walk test shall allow single operator to run audible tests on panel. All logic equation automation shall be suspended during test and while annunciators can be enabled for test, all shall default to disabled state. During advanced walk test, field-supplied output point programming shall react to input stimuli, such as CBE and logic equations. When points are activated in advanced test mode, each initiating event shall latch input. Advanced test shall be audible and shall be used for pull station verification, magnet activated tests on input devices, input and output device, and wiring operation/verification.
 - b. Test feature is intended to provide for certain random spot testing of system and is not intended to comply with requirements of testing fire alarm systems in accordance with NFPA 72, as it is impossible to test all functions and verify items such as annunciation with only 1 person.
 22. Signaling Line Circuits: Each module shall provide communication with analog/addressable (initiation/control) devices via 2 signaling line circuits. Each signaling line circuit shall be capable of being wired Class B, Style 4 or Class A, Style 6. Circuits shall be capable of operating in NFPA Style 7 configuration when equipped with isolator modules between each module type device and isolator sensor bases. Each circuit shall communicate with a maximum of 159 analog sensors and 159 addressable monitor/control devices. Unique 40-character identifier shall be available for each device. Devices shall be of the Velocity series with capability to poll 10 devices at a time with a maximum polling time of 2 seconds when both SLCs are fully loaded.
 23. Notification Appliance Circuits: 2 independent NAC circuits shall be provided on ILI-MB, polarized and rated at 2 amperes DC per circuit,

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individually over current protected and supervised for opens, grounds, and short circuits. They shall be capable of being wired Class B, Style Y or Class A, Style Z.

24. Alarm Dry Contacts: Provide alarm dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system alarm occurs.
25. Supervisory Dry Contacts: Provide supervisory dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system supervisory condition occurs.
26. Trouble Dry Contacts: Provide trouble dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system trouble occurs.

G. Auxiliary Switch Module:

1. Each push-button switch has 3 associated status LEDs (red, yellow, and green), configurable to indicate any combination of functions.
2. Flexible switch configurations to allow auxiliary functions.
3. An insertable label to identify function of each switch and LEDs combination.
4. Provide capability to communicate with up to 16 switch modules locally, or up to 3,000 feet from the Control Panel.

H. Graphic Annunciator: Optional VGA, touch-screen annunciator with the following characteristics:

1. Custom Graphics: Panel shall permit uploading of custom bit-mapped graphic to display screen. Graphic shall display when all systems are normal.
2. Intuitive Functions: In alarm or trouble condition, annunciator shall display only information pertaining to event, including control switches.
 - a. Trouble Condition: Display shall indicate cause of trouble. Only controls available to operator shall be Acknowledge and Reset functions.
 - b. Alarm Condition: Display shall indicate cause of alarm. Only controls available to operator shall be Acknowledge, Silence, and Reset functions.

2.04 PRINTERS

A. Printers: Automatic type, printing code, time, date, location, category, and condition.

1. Provide hard-copy printout of all changes in status of system and time-stamp such printouts with current time-of-day and date.
2. Standard carriage with 80 characters per line.
3. Use standard pin-feed paper.
4. Enclose in separate enclosure suitable for placement on desktop or table.
5. Communicate with control using interface complying with EIA-232-D.
6. Power: 120 VAC at 60 Hz.

2.05 SUPPLEMENTAL NOTIFICATION APPLIANCE CIRCUIT (HPF24)

A. Supplemental Notification Appliance Circuit shall offer [up to 6.0 amps (4.0 amps continuous)] [8.0 amps (6.0 amps continuous)] of regulated 24-volt power. It shall include the following features:

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1. Integral Charger: Charge up to 18.0 amp-hour batteries and support 60-hour standby.
2. 2 Input Triggers. Input trigger shall be Notification Appliance Circuit (from fire alarm control panel) or relay.
3. Surface-mount back box.
4. Ability to delay AC fail delay in accordance with applicable NFPA requirements.
5. Power limited circuitry in accordance with applicable UL standards.
6. Operates as sync follower or a sync generator.

2.06 SYSTEM PERIPHERALS

A. Addressable Devices – General:

1. Provide address-setting means using rotary-decimal switches.
2. Use simple to install and maintain decade-type (numbered 0 to 15) address switches by using standard screwdriver to rotate 2 dials on device to set address. Devices which use binary address set via dipswitch packages, handheld device programmer, or other special tools for setting device address shall not be acceptable.
3. Detectors: Analog and addressable. Connect to fire alarm control panel's Signaling Line Circuits.
4. Addressable Thermal and Smoke Detectors: Provide 2 status LEDs. Both LEDs shall flash under normal conditions, indicating detector is operational and in regular communication with control panel, and both LEDs shall be placed into steady illumination by control panel, indicating alarm condition has been detected. If required, flashing mode operation of detector LEDs can be programmed off via fire control panel program.
5. Fire Alarm Control Panel: Permit detector sensitivity adjustment through field programming of system. Sensitivity can be automatically adjusted by panel on time-of-day basis.
6. Using software, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. Detectors shall be listed by UL as meeting calibrated sensitivity test requirements of NFPA 72, Chapter 7.
7. Detectors shall be ceiling-mounted and shall include separate twist-lock base with tamper-proof feature.
8. Following bases and auxiliary functions shall be available:
 - a. Standard base with remote LED output.
 - b. Sounder base rated at 85 dBA minimum.
 - c. Form-C relay base rated 30 VDC, 2.0 A.
 - d. Isolator base.
9. Detectors shall provide test means whereby they will simulate alarm condition and report that condition to control panel. Such test shall be initiated at detector itself by activating magnetic switch or initiated remotely on command from control panel.
10. Detectors shall store internal identifying type code that control panel shall use to identify type of device (ION, PHOTO, THERMAL).

B. Addressable Manual Stations:

1. Manual Fire Alarm Stations: Non-code, non-break glass type, equipped with key lock so they may be tested without operating handle.

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2. Stations shall be designed so after actual activation, they cannot be restored to normal except by key reset.
 3. Manual stations shall be constructed of Lexan with clearly visible operating instructions provided on cover. The word FIRE shall appear on front of stations in raised letters, 1.75 inches (44 mm) or larger.
 4. Addressable manual stations shall, on command from control panel, send data to panel representing state of manual switch and addressable communication module status.
- C. Intelligent Thermal Detectors: Intelligent addressable devices rated at 135 degrees F (58 degrees C) and have rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. Connect via 2 wires to fire alarm control panel signaling line circuit.
- D. Intelligent Photoelectric Smoke Detectors: Use photoelectric (light-scattering) principal to measure smoke density and shall, on command from control panel, send data to panel representing analog level of smoke density.
- E. Intelligent Ionization Smoke Detectors: Use dual-chamber ionization principal to measure products of combustion and shall, on command from control panel, send data to panel representing analog level of products of combustion.
- F. Intelligent Multi-Criteria Acclimating Detectors:
1. Addressable device designed to monitor a minimum of photoelectric and thermal technologies in single-sensing device. Include ability to adapt to its environment by utilizing built-in microprocessor to determine its environment and choose appropriate sensing settings. Allow wide sensitivity window, with no less than 1 to 4 percent per foot obscuration. Utilize advanced electronics that react to slow smoldering fires and thermal properties within single sensing device.
 2. Microprocessor: Capable of selecting appropriate sensitivity levels based on environment type it is in, such as office, manufacturing, or kitchen, and then have ability to automatically change setting as environment changes, as when walls are moved or as occupancy changes.
 3. Intelligent multi-criteria detection device shall include ability to combine signal of thermal sensor with signal of photoelectric signal to react hastily in event of fire situation. Include inherent ability to distinguish between fire condition and false alarm condition by examining characteristics of thermal and smoke sensing chambers and comparing them to database of actual fire and deceptive phenomena.
- G. Intelligent Laser Detectors: Sensor device designed to use laser diode similar to way photoelectric sensor uses LEDs inside of sensing chamber. Detector design shall allow wide sensitivity window, with no less than 0.2 to 4 percent per foot obscuration. Detector shall be used as indicated in special application clean-room-type environments only.
- H. Intelligent Duct Smoke Detectors:
1. In-Duct Smoke Detector Housing: Use on-board intelligent photoelectric detector, which provides continuous analog monitoring and alarm verification from panel.

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2. When sufficient smoke is sensed, alarm signal is initiated, and appropriate action taken to shut down or change over air handling systems to help prevent rapid distribution of toxic smoke and fire gases throughout areas served by duct system.
 3. Duct Smoke Detectors Mounted Above Ceiling or Otherwise Obstructed from Normal View: Provide with remote alarm indicator.
 4. Each Detector: Install in either supply side or return side duct in accordance with local mechanical code.
- I. Addressable Dry Contact Monitor Modules:
1. Can connect to 1 (up to 10) supervised (Style B) IDC zones or up to 5 supervised (Style D) IDC zones of conventional alarm initiating devices (any N.O. dry contact device) or to 1 of the fire alarm control panel SLCs.
 2. Mount in standard deep electrical box or factory supplied enclosure.
 3. IDC Zone: Suitable for Style D or Style B operation.
 4. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.
- J. 2-Wire Detector Monitor Modules:
1. Provided to connect 1 to 6 supervised IDC zone of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device).
 2. Mount in 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box, optional surface-mounted back box, or factory supplied enclosure.
 3. IDC Zone: Wired for Class A or B (Style D or Style B) operation.
 4. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.
- K. Addressable Control Modules:
1. Provide to supervise and control operation of 1 conventional NAC of compatible, 24-VDC powered, polarized audio/visual notification appliances or UL-listed polarized relays for fan shutdown and other auxiliary control functions.
 2. Mount in standard 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical, surface-mounted back box, or to factory-supplied enclosure.
 3. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.
 4. Control Module NAC: Wire for Style Z or Style Y (Class A/B) with up to 1 amp of inductive signal or 2 amps of resistive signal operation. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized at same time on same pair of wires.
 5. Audio/Visual Power: Provide by separate supervised power circuit from main fire alarm control panel or from supervised, UL-listed remote power supply.
- L. Addressable Relay Modules:
1. Available for HVAC control and other building functions. Relay shall be Form C and rated for a minimum of 2.0 amps resistive or 1.0 amps inductive or shall have 2 Form C sets of contacts that operate in tandem and are rated for a minimum of 2.0 amps resistive or 1.0 amps inductive. Relay coil shall be magnetically latched to reduce wiring connection

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requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized at same time on same pair of wires.

2. Mount in standard 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box, surface-mounted back box, or factory supplied enclosure.
3. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.

M. Isolator Modules:

1. Provide to automatically isolate wire-to-wire short circuits on SLC Class A or Class B branch. Isolator module shall limit number of modules or detectors that may be rendered inoperative by short-circuit fault on SLC loop segment or branch. At least 1 isolator module shall be provided for each floor or protected zone of building. No more than 25 devices shall be connected to 1 isolator module.
2. If wire-to-wire short occurs, isolator module shall automatically open-circuit (disconnect) SLC. When short-circuit condition is corrected, isolator module shall automatically reconnect isolated section.
3. Does not require address-setting, and its operations shall be totally automatic. Not necessary to replace or reset isolator module after normal operation.
4. Mount in standard 4-inch (101.6-mm) deep electrical box or in surface-mounted back box.
5. Single LED: Flash to indicate isolator is operational and illuminate steadily to indicate short-circuit condition has been detected and isolated.

N. Conventional Heat Detectors:

1. Combination rate-of-rise and fixed temperature rated at 135 degrees F (57.2 degrees C) for areas where ambient temperatures does not exceed 100 degrees F (37.7 degrees C), and 200 degrees F (93.3 degrees C) for areas where temperature does not exceed 150 degrees F (65.5 degrees C).
2. Low profile, ceiling-mount type with positive indication of activation.
3. Rate-of-Rise Element: Air chamber, flexible metal diaphragm, and factory-calibrated, moisture-proof, trouble-free vent, and operate when rate of temperature rise exceeds 15 degrees F (9.4 degrees C) per minute.
4. Fixed-Temperature Element: Fusible-alloy retainer and actuator shaft.
5. Smooth Ceiling Rating: 2,500 square feet (762 m²).

O. Conventional Photoelectric Area Smoke Detectors:

1. 24-VDC, 2-wire, ceiling-mounted, light-scattering type using LEDs light source.
2. Each Detector: Remote LEDs output and built-in test switch.
3. Provide on twist-lock base.
4. Perform calibrated sensitivity and performance test on detector without need for generation of smoke. Test method shall test all detector circuits.
5. Visual Indication of Alarm: Provide by dual-latching LEDs on detector, seen from ground level over 360 degrees. LEDs shall flash every 10 seconds, indicating power is applied to detector.
6. Detector shall not go into alarm or trouble when exposed to air velocities of up to 3,000 feet (914.4 m) per minute.

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7. Detector Screen and Cover Assembly: Easily removable for field cleaning of detector chamber.
 8. Field-Wire Connections: Made to base through use of clamping plate and screw.
- P. Conventional Ionization-Type Smoke Detectors:
1. 2-wire, 24-VDC type using dual uni-polar chamber.
 2. Each Detector: Remote LEDs output and built-in test switch.
 3. Provide on twist-lock base.
 4. Perform calibration sensitivity and performance test on detector without need for generation of smoke.
 5. Visual Indication of Alarm: Provide by dual-latching LEDs over 360 degrees, on detector, seen from ground level. LEDs shall flash every 10 seconds, indicating power is applied to detector.
 6. Detector shall not alarm or trouble when exposed to air velocities of up to 1,200 feet (365.76 m) per minute.
 7. Detector Screen and Cover Assembly: Easily removable for field cleaning of detector chamber.
 8. Field-Wire Connections: Made to base through use of clamping plate and screw.
- Q. Addressable Projected Beam Detectors:
1. Single-ended, reflective design.
 2. Six user-selectable sensitivity levels.
 3. Operates in a range from 16 feet to 328 feet.
 4. Temperature Range of Device: Minus 22 degrees F to 131 degrees F.
 5. Beam Detector: Automatic gain control to compensate for gradual signal deterioration from dirt accumulation on lenses.
 6. UL Listed.
 7. Ability to be tested using calibrated test filters or magnet-activated remote test station.
- R. Sprinkler Waterflow Switches (provided and installed by the sprinkler contractor):
1. Integral, mechanical, non-coded, non-accumulative retard type.
 2. Alarm transmission delay time conveniently adjustable from 0 to 60 seconds. Initial settings shall be 30 to 45 seconds.
 3. Single manufacturer and series.
 4. Where possible, locate waterflow switches a minimum of 1 foot from fitting which changes direction of flow and a minimum of 3 feet from valve.
 5. Waterflow switches shall be provided and connected under this section but installed by the mechanical contractor.
- S. Sprinkler and Standpipe Valve Supervisory Switches (provided and installed by the sprinkler contractor):
1. Each sprinkler system water supply control valve riser, zone control valve, and standpipe system riser control valve shall be equipped with supervisory switch. Standpipe hose valves, test valves, and drain valves shall not be equipped with supervisory switches.
 2. PIV (Post Indicator Valve) or Main Gate Valves: Equip with supervisory switch.

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3. Mount not to interfere with normal operation of valve and adjust to operate within 2 revolutions toward closed position of valve control, or when stem has moved no more than one-fifth of distance from normal position.
 4. Contain in weatherproof aluminum housing, which shall provide 3/4-inch (19-mm) conduit entrance and incorporate necessary facilities for attachment to valves.
 5. Switch Housing Finish: Red baked enamel.
 6. Entire Installed Assembly: Tamper proof and arranged to cause switch operation if housing cover is removed or if unit is removed from mounting.
 7. Valve supervisory switches shall be provided and connected under this section and installed by mechanical contractor.
- T. Graphic Annunciator:
1. Communicate to fire alarm control panel via EIA-485 (multi-drop) 2-wire communications loop. Up to 16 annunciator drivers, each configured up to 48 points, shall be connected per ILI-MB-E3.
 2. ANU-48: Provide interface to approved UL-listed graphic-style annunciator and provide each of the features specified.
- U. LCD Display Annunciator:
1. Furnish and install as indicated on the Drawings a remote serial annunciator. Annunciator shall provide 80-character display, which shall duplicate all information on basic system display, including any network nodes its host panel is annunciating, with exception of menus. Contain the following function keys:
 - a. Alarm Acknowledge.
 - b. Trouble Acknowledge.
 - c. Signal Silence.
 - d. System Reset/Lamp Test.
 - e. System Drill Test.
 2. Key Lock: Enable switches only when placed in "ON" position, with exception of Trouble Acknowledge, which is used to silence local trouble audible sounder. Annunciator shall contain the following LEDs:
 - a. Alarm.
 - b. Supervisory.
 - c. System Trouble.
 - d. Power Fault.
 - e. System Silenced.
 3. Mount on standard 3-gang surface or flush electrical box.
 4. Each Main Control Panel: Accommodate up to 5 remote LCD annunciators which shall be located up to 3,000 feet from control panel.
- V. Horns:
1. Operate on 24 VDC or with field-selectable outputs.
 2. Have two selectable tone options of temporal 3 and non-temporal continuous pattern.
 3. Have at least 2 audibility options
- W. Strobes:
1. Compliance: ADA and UL 1971.

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2. Maximum Pulse Duration: 0.2 second.
 3. Strobe Intensity: UL 1971.
 4. Flash Rate: UL 1971.
 5. Strobe Candela Rating: Determine by positioning selector switch on back of device.
- X. Horn/Strobes:
1. Operate on 24 VDC
 2. Have two selectable tone options of temporal 3 and non-temporal continuous pattern.
 3. Have at least 2 audibility options
 4. Maximum Pulse Duration: 0.2 second.
 5. Strobe Intensity: UL 1971.
 6. Flash Rate: UL 1971.
 7. Strobe Candela Rating: Determine by positioning selector switch on back of device.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas and surfaces to receive fire alarm system.
1. Notify Architect of conditions that would adversely affect installation or subsequent use.
 2. Do not begin installation until unacceptable conditions are corrected.

3.02 INSTALLATION

- A. Install fire alarm system in accordance with NFPA 72, NFPA 70, state and local codes, manufacturer's instructions, and as indicated on the Drawings.
- B. Conceal conduit, junction boxes, and conduit supports and hangers in finished areas. Conceal or expose conduit, junction boxes, and conduit supports and hangers in unfinished areas.
- C. Do not install smoke detectors before system programming and test period. If construction is ongoing during this period, take measures to protect smoke detectors from contamination and physical damage.
- D. Flush-mount fire detection and alarm system devices, control panels, and remote annunciators in finished areas. Flush-mount or surface-mount fire detection and alarm system devices, control panels, and remote annunciators in unfinished areas.
- E. Ensure manual stations are suitable for surface mounting or semi-flush mounting as indicated on the Drawings. Install not less than 42 inches, nor more than 48 inches, above finished floor measured to operating handle.

3.03 FIELD QUALITY CONTROL

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- A. Manufacturer's Field Services: Provide service of competent, factory-trained technician authorized by manufacturer to technically supervise and participate during pre-testing and acceptance testing of system.

- B. Testing:
 - 1. Conduct complete visual inspection of control panel connections and test wiring for short circuits, ground faults, continuity, and insulation before energizing cables and wires.
 - 2. Close each sprinkler system control valve and verify proper supervisory alarm at Control Panel.
 - 3. Verify activation of flow switches.
 - 4. Open initiating device circuits and verify that trouble signal actuates.
 - 5. Open signaling line circuits and verify that trouble signal actuates.
 - 6. Open and short notification appliance circuits and verify that trouble signal actuates.
 - 7. Ground initiating device circuits and verify response of trouble signals.
 - 8. Ground signaling line circuits and verify response of trouble signals.
 - 9. Ground notification appliance circuits and verify response of trouble signals.
 - 10. Check installation, supervision, and operation of intelligent smoke detectors.
 - 11. Introduce on system each of the alarm conditions that system is required to detect. Verify proper receipt and proper processing of signal at Control Panel and correct activation of control points.
 - 13. Consult manufacturer's manual to determine proper testing procedures when system is equipped with optional features. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality, and similar.

- C. Acceptance Testing:
 - 1. Before installation shall be considered completed and acceptable by AHJ, a complete test using as a minimum, the following scenarios shall be performed and witnessed by representative approved by Engineer. Monitoring company and/or fire department shall be notified before final test in accordance with local requirements.
 - 2. Contractor's job foreman, in presence of representative of manufacturer, representative of Owner, and fire department shall operate every installed device to verify proper operation and correct annunciation at control panel.
 - 3. Open signaling line circuits and notification appliance circuits in at least 2 locations to verify presence of supervision.
 - 4. When testing has been completed to satisfaction of both Contractor's job foreman and representatives of manufacturer and Owner, a notarized letter co-signed by each attesting to satisfactory completion of said testing shall be forwarded to Owner and fire department.
 - 5. Leave fire alarm system in proper working order and, without additional expense to Owner, replace defective materials and equipment provided within 1 year (365 days) from date of final acceptance by the owner.

3.04 DEMONSTRATION

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- A. Provide instruction as required for operating fire alarm system.
- B. Provide hands-on demonstrations of operation of fire alarm system components and functions.

END OF SECTION 13850

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SECTION 15010 BASIC MECHANICAL REQUIREMENTS

PART 1 – GENERAL

1.01 WORK INCLUDED:

- A. The requirements of this SECTION apply to all the work of DIVISION 15.
- B. Provide a complete working installation with all equipment called for in proper operating condition. Documents do not undertake to show or list every item to be provided. When an item not shown or listed is clearly necessary for proper operation of equipment which is shown or listed, provide an item which will allow the system to function properly at no increase in Contract Sum.

1.02 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. In accordance with the requirements of DIVISION 1.
2. Nothing in the Drawings or Specifications shall be construed to permit work not conforming to applicable laws, ordinances, rules, regulations.
3. When Drawings or Specifications exceed requirements of applicable laws, ordinances, rules, regulations, Drawings and Specifications take precedence.
4. It is not the intent of Drawings or Specifications to repeat requirements of codes except where necessary for completeness or clarity.
5. If any of the requirements of the above are in conflict with one another, or with the requirements of these Specifications, the most stringent shall govern.
6. If the Drawings and Specifications are in conflict, or with each other, the most stringent shall apply.
7. 2012 IBC - International Building Code.
8. 2012 UMC - Uniform Mechanical Code.
9. 2012 UPC - Uniform Plumbing Code.
10. Nevada State Regulatory Agencies.
11. Utility Company Regulations.

B. Reference Standards:

1. ANSI - American National Standards Institute.
 - a. A13.1, "Scheme for the Identification of Piping Systems."
2. SMACNA - Sheet Metal and Air Conditioning Contractors National Association.
3. ASME - American Society of Mechanical Engineers.

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SECTION 15010 BASIC MECHANICAL REQUIREMENTS

4. AMCA - Air Movement and Control Association.
5. NFPA - National Fire Protection Association.
6. NUSIG - National Uniform Seismic Installation Guide.
7. UL - Underwriters Laboratory.
8. ETL - Electric Testing Laboratory.
9. FCC - Federal Communications Commission.
10. ADA - American with Disabilities Act.
11. OSHA - Occupation Safety and Health Act.

1.03 SUBMITTALS

A. General:

1. Submit Shop Drawings, penetration locations, supplemental data, for all materials, equipment in all SECTIONS of this DIVISION in accordance with the requirements of "SHOP DRAWINGS, PRODUCT DATA, and SAMPLES" and as specified hereinafter.
2. Forward all submittals to Architect, together, at one time. Individual or incomplete submittals are not acceptable. Submittals shall be in three ring binders.
3. Identify each item by manufacturer, brand, trade name, number, size, rating, or whatever other data is necessary to properly identify and check materials and equipment. Words "as specified" are not sufficient identification.
4. Identify each submittal item by reference to project name, date, specification section paragraph in which item is specified, or drawings and detail number.
5. Organize submittals in same sequence as they appear in specification sections, articles or paragraphs.
6. Shop Drawings shall show physical arrangement, construction details, finishes, materials used in fabrications, provisions for piping entrance, access requirements for installation and maintenance, physical size, mechanical characteristics, foundation and support details, weight.
 - a. Specifically indicate, by drawn detail or note, that equipment complies with each specifically stated requirement of the Contract Documents.
 - b. Drawings shall be drawn to scale and dimensioned (except piping diagrams not to scale) may be prepared by vendor but submit as instruments of Contractor, thoroughly checked and stamped by Contractor before submission to Architect for review.
 - c. Catalog cuts and published material may be included to supplement scale drawings.

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SECTION 15010 BASIC MECHANICAL REQUIREMENTS

7. Submittal checking is only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Any action shown is subject to the requirements of the plans and specifications. Contractor is responsible for: dimensions which shall be confirmed and correlated at the jobsite; fabrication processes and techniques of construction, coordination of his work with that of all other trades; satisfactory performance of his work; regulatory agency approval when applicable.
 8. One submittal review and one additional review for rejected or revised submittals will be provided. Additional reviews will be billed to the contractor at the current hourly rate.
- B. Operating and Maintenance Instructions and Manuals: In accordance with the following requirements:
1. Subsequent to completion of balancing, testing operations, this DIVISION is responsible for instructing the Owner's authorized representatives in operation, adjustment and maintenance of mechanical plant. Submit three (3) copies of certificate, signed by Owner's representatives, attesting to their having been instructed.
 2. Before Owner's personnel assume operation of systems, submit three (3) sets of operating maintenance instructions, manuals, parts lists on mechanical plant, its component parts including all major equipment and/or that equipment which requires, or for which manufacturer recommends maintenance in a specified manner. Data sheets shall show complete internal wiring, mechanical and electrical ratings and characteristics, catalog data on component parts whether furnished by equipment manufacturer or others, names, addresses and telephone numbers of source of supply for parts subject to wear or electrical failure, and description of operating, test, adjustment, and maintenance procedures.
 - a. Where data sheets included in manual cover equipment, options, or other features no part of equipment actually furnished, line out these references or otherwise clearly mark so remaining text, diagrams, drawings, schedules, and similar information remaining shall apply specifically to equipment furnished.
 - b. Bind data in vinyl covered loose-leaf binders with title index tabs identifying items therein include:
 - 1) Gas Fired Make Up Air Unit with Evaporative cooling;
 - 2) Packaged AC Units;
 - 3) Vehicle Exhaust System;
 - 4) Welding Exhaust Systems;
 - 5) Air Distribution;
 - 6) Insulation - Pipe & Ductwork;
 - 7) Exhaust Fans;

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SECTION 15010 BASIC MECHANICAL REQUIREMENTS

- 8) Temperature Controls;
 - 9) Plumbing Fixtures;
 - 10) Trench Drains;
- c. Submit drafts of instruction sheets to Architect for review before preparing final sets.
 - d. Not all items listed above require maintenance however they are listed for scope.
3. RECORD DRAWINGS: Maintain at all times during construction, a complete set of pertinent drawings which shall be maintained correct to show actual construction of mechanical work. Upon completion of work, request a set CAD files of original drawings from the Architect and transfer all Record Drawing corrections to cad drawing and deliver corrected files together with one set of blue line prints to Architect. All corrections made to cad drawings shall be of a quality equal to that of original.
 4. GUARANTEE: Contractor shall submit written Guarantee stating that all work under this Section shall be guaranteed against any defects in materials and/or workmanship for a period of one year from date of Notice of Completion and defective work which develops during guarantee period shall be repaired and/or replaced at no additional cost to Owner.
 5. Provide reduced scale control diagrams. Diagrams shall show equipment, controls, control sequences, etc., marked to correspond to identification on equipment.
- C. Reports from manufacturers authorized and trained personnel certifying their supervision of equipment installation and start-up procedures.
- 1.04 PRODUCT DELIVERY, STORAGE AND HANDLING
- A. Ship equipment in its original package to prevent damage or entrance of foreign matter. Perform all handling and shipping in accordance with manufacturer's recommendations. Provide protective coverings during construction.
 - B. Identify materials and equipment delivered to site to permit check against approved materials list, reviewed Shop Drawings.
 - C. Protect from loss or damage. Replace lost or damaged materials and equipment with new at no increase in Contract Sum.
- 1.05 DRAWINGS AND COORDINATION WITH OTHER WORK
- A. Drawings:
 1. For purposes of clarity, legibility, Drawings are essentially diagrammatic to extent that many offsets, bends, unions, special fittings, exact locations of items are not indicated, unless specifically dimensioned.
 2. Exact routing of piping, ductwork, etc., shall be governed by architectural and structural conditions, obstructions. Contractor shall make use of data in Contract Documents. In addition, Architect reserves right, at no increase in Contract Sum, to make any reasonable change in location of mechanical items, exposed at ceiling and/or walls, to group them into

TECHNICAL SPECIFICATIONS

SECTION 15010 BASIC MECHANICAL REQUIREMENTS

orderly relationships and/or increase their utility. Contractor shall verify Architect's requirements in this regard prior to roughing-in.

3. Dimensions, duct space, location of doors, partitions, similar physical features shall be taken from Architectural Drawings, verified at site under this DIVISION. Consult Architectural features, panels, etc. at the approximate location shown on Mechanical Drawings. Coordinate location of all ceiling mounted items with "REFLECTED CEILING PLAN".
4. Mounting heights of brackets, outlets, etc. shall be as required.

B. Coordination:

1. Work out all "tight" conditions involving work under this DIVISION and work in other DIVISIONS in advance of installation. If necessary, and before work proceeds in these areas, prepare Shop Drawings under this DIVISION for review showing all work in "tight" areas. Provide Shop Drawings, additional work necessary to overcome "tight" conditions, at no increase in Contract Sum. Failure to provide Shop Drawings will be at the Contractor's risk.
2. Differences or disputes concerning coordination, interference or extent of work between SECTIONS shall be decided by Contractor, his decision, if consistent with Contract Documents requirements, and shall be final.
3. Coordinate electrical interlocks of mechanical equipment with DIVISION 16.
4. Provide templates, information and instructions to other DIVISIONS to properly locate holes and openings to be cut or provided for electrical work.
5. Not all offsets in ductwork or piping are shown. Contractor shall decide which item to offset or relocate. Maintain required slope in piping.
6. Responsibility for problems as a result of not providing shop drawings shall be borne by the contractor.
7. Round duct may not be substituted for rectangular ducts unless approved by the architect. If reshaping of rectangular duct is required to fit space it shall be done at no increase of contract sum.
8. Mechanical contractor shall prepare systems for testing.
9. Final inspection will not be performed until test and balance report has been provided to Engineer for evaluation.

- C. Large Scale Layout Drawings: In accordance with requirements of SECTION "RECORD DOCUMENTS" prepare large scale detailed layout drawings showing locations of equipment, piping runs, ductwork, and all other elements of mechanical systems provided under this DIVISION. Include sections of all congested areas to show relative position and spacing of affected elements. Problems resulting from failure to provide lay-out drawings shall be contractors risk.

D. Equipment Rough-In:

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SECTION 15010 BASIC MECHANICAL REQUIREMENTS

1. Rough-in locations shown on Mechanical Drawings for equipment furnished by Owner and for equipment furnished under other DIVISIONS are approximate only. Obtain exact rough-in locations from following sources:
 - a. From Shop Drawings for Contractor furnished and installed equipment.
 - b. From Architect or Owner furnished, Contractor installed equipment.
 - c. From existing equipment where such equipment is relocated under this Contract.
2. Verify mechanical and electrical characteristics of equipment before ordering equipment or starting rough-in. Where conflict exists between equipment and rough-in shown on Drawings obtain clarification from Architect and provide as directed.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Identify materials, equipment by manufacturer's name, nameplate data. Remove unidentified materials, equipment from site.
- B. Equipment specified by manufacturer's number shall include all accessories, controls, etc., listed in catalogue as standard with equipment. Furnish optional or additional accessories as specified.
- C. Where no specific make of material or equipment is mentioned, any first class product of reputable manufacturer may be used, provided it conforms to requirements of system and meets with acceptance.
- D. Equipment, material damaged during transportation, installation, operation is considered as totally damaged. Replace with new. Variance from this permitted only with written acceptance from the owner and architect.
- E. Provide an authorized representative to constantly supervise work of this DIVISION, check all materials prior to installation for conformance with Drawings, Specifications, and reviewed Shop Drawings.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Manufacturer's Directions: Follow in all cases where manufacturers of articles furnish directions covering installation points not specified or shown.
- B. Equipment which is required to be field assembled shall be assembled at no extra cost and under the direct supervision of the manufacturer's agent. Prior to the final acceptance submit letters from the manufacturers that this has been done.
- C. Equipment: Accurately set and level with supports neatly placed and properly fastened. Properly fasten equipment in place with bolts to prevent movement in earthquake. No allowance of any kind will be made for negligence on part of Contractor to foresee means of bringing in, installing equipment into position inside building.

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SECTION 15010 BASIC MECHANICAL REQUIREMENTS

D. Piping and/or Ductwork Systems:

1. Work into complete, integrated arrangement with like elements to make work neat appearing, finished.
2. Run concealed, except as shown otherwise; where exposed, parallel with walls or structural elements; vertical runs plumb, horizontal runs level, parallel with structure or uniformly pitched as appropriate.
3. Install with adequate passageways free from obstructions, as high as practicable to maintain adequate head room, as shown or required. Notify Architect before installation whenever head room of less than 7-feet 6-inches or as called for on drawings will result. Coordinate with work of other DIVISIONS to achieve proper head room as specified in this DIVISION.
4. Clearance: Do not obstruct spaces required by Equipment Manufacturers Requirements Code in front of electrical or mechanical equipment, access doors, etc.
5. Flash and counterflash all pipes and ducts through roof in accordance with requirements of "FLASHING AND SHEET METAL".
6. Plumbing vent terminations in roof shall be a minimum of 15 feet horizontally from outside air intakes regardless of where shown.
7. Penetrations:
 - a. Insulated piping or ductwork through sleeves shall have uninterrupted insulation inside sleeves or openings. Pack space between piping or ductwork and sleeve or opening with noncombustible material capable of withstanding fire test in compliance with UBC Standard 43-1.
 - b. Make penetrations through floors watertight with mastic even though concealed within wall or furred space. Provide suitable flange below slab to prevent packing from falling out. Caulk space between pipe or duct and concrete to full concrete thickness with asbestos-free safing material and mastic.
 - c. Make penetrations through any waterproofed surfaces by appropriate means to maintain integrity of system penetrated. Includes penetrations caused by hangers suspended off such surfaces.
8. Expansion and Contraction: Make adequate provisions, whether those provisions are shown or not. See Piping Specialties Section.
9. Cleaning and Closing: Inspect all piping, ductwork and equipment and clean as required before closing. Close all piping and ductwork at end of each day's work.

E. Hangers, Supports, Anchors and Chases:

1. Devices complete as required for installation of mechanical work.
2. Devices to be of metal only; no wood or combustible material will be permitted.
3. Hangers, anchors and supports for pipe and duct runs: As shown or required.

TECHNICAL SPECIFICATIONS

SECTION 15010 BASIC MECHANICAL REQUIREMENTS

4. Provide concrete inserts where required for attachment of hangers; subject to structural engineer's review.
5. Anchors for floor and wall mounted equipment as shown or required.
6. Supports for wall mounted equipment as shown or required.
7. Seismic anchors and supports for Zone 3. Reference: N.U.S.I.G. "NATIONAL UNIFORM SEISMIC INSTALLATION GUIDE."

3.02 PERFORMANCE

A. Excavating and Backfilling:

1. In accordance with the requirements of "EARTHWORK".
2. Provide all necessary shoring, sheeting, pumping as part of work of this DIVISION.
3. Dig trenches straight, true to line and grade with bottoms smoothed of any rock points. Excavate 3-inches below grade of pipe, fill with sand properly packed. Support pipe for entire length on packed sand. Shape or pack bottom of trenches for pipe, duct fittings, hubs, couplings, etc. using templates to fit outside periphery of lower third of piping and ductwork. Cover for all other piping shall be in accordance with code. Water piping outside building shall have 36-inch minimum cover.
4. Verify that sewer depth has the proper relationship to footings as detailed on the structural drawings. If it appears that they do not, notify the Architect immediately.
5. Utilize Utility Company locating services or other methods prior to commencing with any work. All excavating will be by hand near any utilities, including, but not limited to natural gas, electrical, water, fire alarm, fire service, irrigation, etc.
6. Backfill:
 - a. After piping has been installed, tested and approved, backfill all excavations, tamp and compact by compressed air tampers.
 - b. Backfill to 6-inches above crown of pipe. Material shall consist of unwashed sand, with remainder of trench backfilled and mechanically tamped in 6-inch maximum layers of selected excavated materials, free from organic matter, rocks, etc.
7. In any asphalt or concrete paved areas, backfill only to subgrade level.

B. Concrete: In accordance with the requirements of DIVISION 3.

C. Sleeves, Chases, and Concrete Inserts:

1. This DIVISION shall provide, to cause no delay, all required sleeves, chases, concrete inserts, anchor bolts, etc., before concrete is poured, be responsible for correct location, installation of same.

TECHNICAL SPECIFICATIONS

SECTION 15010 BASIC MECHANICAL REQUIREMENTS

2. Sleeves and chases are prohibited in structural members, except where shown or directed by the Architect in writing.
 3. Embed no piping in concrete or masonry.
 4. Locating and sizing of openings for ductwork through walls, roof, etc., under this DIVISION. Framing of openings provided by respective DIVISIONS in whose work opening is made.
 5. Sleeves shall be metal or plastic.
- D. Cutting and Repairing:
1. Do all cutting, repairing, including structural reinforcing, necessary for work under this DIVISION.
 2. Do no cutting or patching without Architect's review. Repair damage done by this cutting equal to original condition in Architect's opinion.
 3. Assume responsibility for all damage to any part of premises or work of other DIVISIONS, caused by leaks or breaks in piping or equipment furnished and/or installed under this DIVISION during construction and guarantee period.
- E. Openings:
1. Contractor shall determine exact location and size of openings required in the building for pipe and ductwork penetrations.
- 3.03 TESTING AND ADJUSTING
- A. Furnish all labor and test equipment required under this DIVISION.
 - B. Clean and purge equipment and piping before each test.
 - C. Test various mechanical systems in portions as work progresses. Any system or portion previously tested shall become part of any repeated test when it becomes part of distribution or collection system.
 - D. Repair leaks by remaking with new material. Makeshift leak stopping methods are not acceptable.
 - E. Should any piece of equipment or material fail in any of the tests, immediately remove, replace with new; retest system.
 - F. Maintain test pressures for periods stated, or as directed, without loss in pressure except that due to change in temperature or atmospheric pressure during test.
 - G. Perform all tests in accordance with requirements and under supervision of authorities having jurisdiction.
 - H. After completion of testing and adjustment, operate the different systems and equipment under normal working conditions for two (2) days for seven (7) hours each day, and show specified

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SECTION 15010 BASIC MECHANICAL REQUIREMENTS

performance. If, in the opinion of the Architect, performance or equipment or systems is not in accordance with Specifications or submitted data, alter or replace equipment at no increase in Contract Sum. Contractor at his option may order tests from an independent approved laboratory to prove compliance. All such tests shall be at no increase in Contract Sum.

- I. At completion of work, provide written certification that all systems are functioning properly without defects.
- J. Testing:
 - 1. Domestic hot water, hot water return and cold water: Test to 100-psig with water. Pressure shall be maintained for 8 hours with no noticeable drop.
 - 2. Waste and vent: Test to 5 psig with air. Pressure shall not have any noticeable drop within a 15 minute period. See "Installation" in Section 15050 and use test plugs.
 - 3. Natural Gas: Test to 60 psig with air. Pressure shall not drop for a period of 24 hours. Check all joints with a soap solution.
 - 4. Compressed Air: Test to 200-psig with air. Pressure shall be maintained for 8 hours with no noticeable drop.
 - 5. Lubrication Oil, Hydraulic Fluid and Automatic Transmission Fluid Piping: 3000 psi with dry nitrogen. Pressure shall be maintained for 8 hours with no noticeable drop.
 - 6. Grease Piping: 4000 psi with dry nitrogen. Pressure shall be maintained for 8 hours with no noticeable drop.

3.04 CLEANING AND PAINTING

- A. Properly prepare exposed work under this DIVISION to be finish painted.
- B. Refinish work supplied with final finish under this DIVISION if damaged under this DIVISION to satisfaction of Architect.
- C. Thoroughly clean all equipment, fans, motors, piping and all other materials under this DIVISION free from all rust scale and all other dirt before any covering or painting is done, or the systems put in operation. Leave in condition satisfactory to the Architect.
- D. Protect all finished surfaces of fixtures with heavy paper pasted thereon, or by other means, throughout the period of construction.
- E. Clean ductwork inside and out before grilles are installed and before fans are operated.
- F. All interior surfaces of ceiling diffusers, registers, grilles, etc., including ductwork visible from inside the building, shall be etched, primed, and painted flat black.

3.05 EQUIPMENT IDENTIFICATION

- A. Properly identify each piece of equipment and controls pertaining thereto by means of engraved laminated plastic descriptive nameplates mounted on equipment and controls using round head

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SECTION 15010 BASIC MECHANICAL REQUIREMENTS

brass machine screws, pop rivets or contact cement. Cardholders in any form not acceptable. Label shall contain the symbol, duty, capacity, and pressure.

- B. Provide typewritten list of equipment in triplicate, indicating location, service for each piece of equipment, suitably framed, with glass front.
- C. Information on nameplate shall include equipment capacity, pressure, etc.

3.06 CEILING MARKERS

- A. Provide color coded ceiling markers to locate critical maintenance items. Marker shall be a tack with a 1/2-inch diameter painted head and of sufficient length to penetrate tile.
- B. Items and color shall be:

<u>Item</u>	<u>Color</u>
Valve	Green

3.07 DAMPER MARKERS

- A. Provide markers for all manual duct dampers above ceilings.
- B. Markers: 1-inch wide, 1-foot long. Color: International orange.
- C. Tie markers to damper quadrant.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 15030 ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT

PART 1 – GENERAL

1.01 DESCRIPTIONS

- A. This section specifies the basic requirements for electrical components which are an integral part of packaged mechanical equipment. These components include, but are not limited to, factory installed motors, starters, and disconnect switches furnished as an integral part of packaged mechanical equipment. Switchgear listed below will only be furnished if not included with equipment or not furnished under the Electrical Section of work.

1.02 SUBMITTALS

- A. No separate submittal is required. Submit product data for motors, starters, and other electrical components with submittal data required for the equipment for which it serves, as required by the individual equipment specification sections.
- B. Related Work In Other Sections:
 - 1. Power wiring and conduit.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Motors: The following are basic requirements for simple or common motors. For special motors, more detailed and specific requirements are specified in the individual equipment specifications.
 - 1. Torque characteristics shall be sufficient to satisfactorily accelerate the driven loads.
 - 2. Motor sizes shall be large enough so that the driven load will not require the motor to operate in the service factor range.
 - 3. 2-speed motors shall have 2 separate windings on poly-phase motors. Coordinate starter compatibility with electrical section.
 - 4. Temperature Rating: Rated for 40 degree C environment with maximum 50 degree C temperature rise for continuous duty at full load (Class A Insulation).
 - 5. Starting Capability: Frequency of starts as indicated by automatic control system, and not less than 5 evenly time spaced starts per hour for manually controlled motors.
 - 6. Service Factor: 1.15 for poly-phase motors and 1.35 for single phase motors.
- B. Motor Construction: NEMA Standard MG 1, general purpose, continuous duty, Design "B", except "C" where required for high starting torque.
 - 1. Frames: NEMA Standard No. 48 or 54; use driven equipment manufacturer's standards to suit specific application.
 - 2. Bearings:

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- a. Ball or roller bearings with inner and outer shaft seals;
 - b. Re-greasable, except permanently sealed where motor is normally inaccessible for regular maintenance;
 - c. Designed to resist thrust loading where belt drives or other drives produce lateral or axial thrust in motor;
 - d. For fractional horsepower, light duty motors, sleeve type bearings are permitted.
3. Enclosure Type:
- a. Open drip-proof motors for indoor use where satisfactorily housed or remotely located during operation;
 - b. Guarded drip-proof motors where exposed to contact by employees or building occupants;
 - c. Weather protected Type 1 for outdoor use, Type II where not housed.
4. Overload Protection: Built-in thermal overload protection and, where indicated, internal sensing device suitable for signaling and stopping motor at starter.
5. Noise Rating: "Quiet".
6. Efficiency: "Energy Efficient" motors shall have a minimum efficiency as scheduled in accordance with IEEE Standard 112, test method B. If efficiency not specified, motors shall have a higher efficiency than "average standard industry motors", in accordance with IEEE Standard 112, test method B.
7. Nameplate: Indicate the full identification of manufacturer, ratings, characteristics, construction, special features and similar information.
- C. Starters, Electrical Devices, and Wiring:
1. Motor Starter Characteristics:
 - a. Enclosures: NEMA 1, general purpose enclosures with padlock ears, except in wet locations shall be NEMA 3R with conduit hubs, or units in hazardous locations which shall have NEC proper class and division.
 - b. Type and size of starter shall be as recommended by motor manufacturer and the driven equipment manufacturer for applicable protection and start-up condition.
 2. Manual switches shall have:
 - a. Pilot lights and extra positions for multi-speed motors.
 - b. Overload protection: Melting alloy type thermal overload relays.
 3. Magnetic Starters:

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ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT

- a. Maintained contact push buttons and pilot lights, properly arranged for single speed or multi-speed operation as indicated.
 - b. Trip-free thermal overload relays, each phase.
 - c. Interlocks, pneumatic switches and similar devices as required for coordination with control requirements of Division-15 Controls section.
 - d. Built-in 120 volts control circuit transformer, fused from line side, where service exceeds 240 volts.
 - e. Externally operated manual retest.
 - f. Under-voltage release or protection.
4. Motor Connections:
- a. Flexible conduit, except where plug-in electrical cords are specifically indicated.
5. Capacitors:
- a. Features:
 - Individual unit cells;
 - All welded steel housing;
 - Each capacitor internally fused;
 - Nonflammable synthetic liquid impregnant;
 - Craft tissue insulation;
 - Aluminum foil electrodes;
 - b. KVAR size shall be as required to correct motor power factor to 90 percent or better and shall be installed on all motors 1 horsepower and larger, that have an uncorrected power factor of less than 85 percent at rated load.
6. Disconnect Switches:
- a. Fusible Switches: Fused, each phase; general duty; horsepower rated; non-teasible quick-break mechanism; dead front line side shield; solderless lugs suitable for copper or aluminum conductors; spring reinforced fuse clips; electro silver plated current carrying parts; hinged doors; operating lever arranged for locking in the "OPEN" position; arc quenchers; capacity and characteristics as indicated.
 - b. Non-fusible Switches: For equipment 2 horsepower and smaller, shall be horsepower rated; toggle switch type; quantity of poles and voltage rating as indicated. For equipment larger than 2 horsepower, switches shall be same as fusible type.

PART 3 – EXECUTION (Not Applicable).

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 15050 BASIC MECHANICAL MATERIALS AND METHODS

PART 1 – GENERAL

1.01 DESCRIPTION

- A. The requirements of this SECTION apply to all Work of DIVISION 15 where applicable.
- B. Where items specified in other SECTIONS of DIVISION 15 conflict with requirements of this SECTION, the former shall take precedence.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. All items of materials in each category of equipment shall be of one manufacturer.
- B. Access Doors: Furnish under this DIVISION where shown, or required by Regulatory Agencies and for access to all concealed valves, shock absorbers, coils, unions, control dampers, fire dampers, etc., even though access doors are not shown for Mechanical Work. Doors shall be in accordance with requirements of SECTION "ACCESS DOORS". Doors in this DIVISION, SECTION "ACCESS DOORS" and DIVISION 16 shall all be of same manufacturer for identical appearance and keying. Sizes: 24-inch x 24-inch minimum for ceilings and 12-inch x 12-inch minimum for walls. Furnish fire rated doors where required. Deliver doors to General Contractor for installation. Mark each door to accurately establish its location.
- C. Conform with conditions shown and specified. Coordinate with other trades for best possible assembly of combined Work. Relocate equipment when necessitated by failures to coordinate work or to advise Architect of conflicts in writing.
- D. Use printed descriptions, specifications and recommendations of manufacturers as a guide for installation of work.
- E. Design of mechanical systems is generally based on product of one of the manufacturers cited. Where systems for product installed necessitates modification of systems shown on plans, Contractor is responsible for installation of systems appropriate to product installed.
- F. Materials and Equipment - General Requirements:
 - 1. New.
 - 2. Approved for use by State Fire Marshal and local building inspection department when applicable.
 - 3. Testing agency labeled or with other identification wherever standards have been established.
 - 4. Architect reserves right to reject items not in accordance with this Specification either before or after installation.
 - 5. Comprised to render complete and operable systems; provide additional items needed to complete installation to realize design.

TECHNICAL SPECIFICATIONS

SECTION 15050 BASIC MECHANICAL MATERIALS AND METHODS

6. Groups of items having same or similar function shall be by single manufacturer to facilitate maintenance and service.
 7. Compatible with space allocated. Modifications necessary to adjust items to space limitations at Contractor's expense.
 8. Installed fully operating and without objectionable noise or vibration.
- G. Mechanical Equipment and Material Categories:
1. Piping and Fittings:
 - a. Standard weight cast iron soil pipe with no-hub stainless steel band and neoprene collar, conforming to current CISPI 301 standard: Waste, vent and storm drain inside building to a point five feet outside building.
 - b. Type "L" hard drawn copper tubing with wrought copper fittings conforming to ASTM B88-83 using 95:5 tin/antimony solder: Domestic cold water, hot water, hot water return, and compressed air inside building above slab.
 - c. Type "K" hard drawn copper tubing with wrought copper fittings conforming to ASTM B88-83 using "SIL-FOS" silver solder: Domestic cold water below slab and grade, compressed air and glycol piping.
 - d. Seamless 304 stainless steel piping with 0.065 wall thickness rated for 3300 psi (3/4") ASTM-A-269 or ASTM-A-213. Lubricating oils, hydraulic and automatic transmission fluids.
 - e. Seamless 304 stainless steel piping with 0.083 wall thickness rated for 4200 psi (3/4") ASTM-A-269 or ASTM-A-213. Grease
 - f. Schedule 40 PVC solvent weld pipe and fittings: Condensate drains.
 - g. Schedule 40 black steel with 150 pound black malleable iron screwed fittings conforming to Standard ANSI B16.3-1977 2-1/2" and smaller. Pipe and fittings 3" and larger shall be welded: Natural gas above slab.
- H. Cleanouts:
1. Provide and install cleanouts where indicated and at all bends, angles and upper terminals, urinals and sinks. All shall be accessible. All cleanouts shall be the same as pipe served.
 2. Wall cleanouts in toilet rooms shall be cast iron cleanout tee with cast bronze countersunk plug complete with round, stainless steel access cover with securing screw. Zurn #Z-1468 or equal. Wall cleanouts shall be roughed-in 12 to 18" above finished floor.
 3. Interior cleanouts in finished floor shall be adjustable floor level after slab has been poured and set with square scoriated top of nickel bronze, vandal-proof screws, cast brass cleanout plug. Zurn #ZN-1400-VP or equal.
 4. Heavy duty cleanouts, heavy duty cleanout cover with secured scoriated top with internal

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SECTION 15050 BASIC MECHANICAL MATERIALS AND METHODS

cleanout. Zurn #Z1474-N or equal.

5. Exterior cleanouts shall be cast iron cleanout housing secured scoriated top with lifting device and the word "CLEANOUT" cast integral. Zurn #Z-1400-VP with vandal proof secured top or equal.

2.02 FABRICATION AND MANUFACTURE

- A. Follow manufacturer's directions in all cases where manufacturers of articles used furnish directions covering all points not shown or specified.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Installation of Piping:

1. Definition of "PIPING": The term "piping" as used in Drawings or in Specifications, means all pipe, fittings, nipples, valves, unions, etc., as may be required for complete, functional system.
2. Accurately cut pipe and work into place without springing or forcing, except when cold springing is required.
3. Install pipe lines free from traps and air pockets. Arrange water piping for draining at low points and vent at high points free of traps, sags and bends. Drain valves shall be accessible.
4. Piping in any partitions, through plates, studs, etc., shall have sufficient clearance from structure to allow for expansion, contraction of piping. No bare piping should touch wood, concrete, etc., at any time. Do not place piping in a fire rated or smoke partition.
5. If noise appears after building is completed, Contractor shall perform necessary work to eliminate noise, refinish walls, floors, etc., disturbed by such Work at no increase in Contract Sum.
6. Horizontal building waste & drains shall be sloped a minimum of ¼"/ft.

B. Piping Joints:

1. Copper: Cut copper tubing with copper tube cutters, size with sizing tool and thoroughly clean before application of flux or solder. Piping above slab shall be 95:5 tin-antimony and piping below grade/slab shall be made up with 15% silver solder.
2. No-hub cast iron fittings shall be made in accordance with pipe manufacturer's recommendations including torque. Use a regular or adhesive lubricant to maintain air pressure test.
3. Piping joined by welding where called for and shall be in accordance with the procedure outlined in the USA Piping Code and each welder shall be certified by the National Certified Pipe Welding Bureau, or by other reputable Testing Laboratory or Agency. If requested by

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SECTION 15050 BASIC MECHANICAL MATERIALS AND METHODS

the Architect the Contractor shall demonstrate the proficiency of any welder questioned at the Site.

4. Stainless steel piping shall be joined using compression fittings rated at 4000 psi installed on 0.065 tubing and 5500 psi installed on 0.083 tubing equal to Parker "Ferulok" fittings. Install in strict accordance with the manufacturers written instructions.
 5. Plastic piping shall be installed in accordance with the pipe manufacturer's printed instructions.
- C. Copper tubing systems shall have IPS red brass pipe or nipples at all connections requiring rigidity (at equipment, through roof, at anchors, etc.).
- D. Reducers, increasers for all valves, strainers, etc., shall be line size unless otherwise shown or specified. Straight or eccentric reducers to suit shall be installed as close as possible to connection of greater or smaller size than pipe line (equipment, temperature control valves, etc.). Use of bushings or close nipples not allowed.
- E. Provide union or flange at each connection to equipment, on both sides of control valves, downstream of each valve, at each strainer and trap. Install unions at both ends of valves, strainers, etc., when valves, strainers etc., are specified in welded steel piping, install screwed flanges.
- F. Install valves with operators at or above centerline.
- G. Install check valves, strainers in horizontal position.
- H. Copper to Steel Connections:
1. Make all copper pipe connections to ferrous piping with Victaulic Waterway fittings.
 2. Make buried copper or brass piping connections to steel or cast iron piping with dielectric isolation flanges, field wrapped with two (2) layers of "Scotchrap" or equal, applied according to manufacturers instructions. Each wrapping 5-feet minimum in all directions from connection. Cover taped piping with 15-pound tar of asphalt saturated felt jacket taped in place, to provide protection during backfill.
- I. Provide all piping passing through finish floors, ceilings, partitions or walls exposed to view with chromium plated escutcheons. Fit escutcheons for insulated pipe over insulation. Provide pipe clamps on all penetrations of floors.
- J. Provide rigid support of all piping penetrating fire walls.
- K. Provide dirt legs, unions, and U/L or AGA approved gas cocks at natural gas connection to equipment.
- L. Pipe Hangers and Supports:
1. All piping supports, hangers, hanger rods, etc., shall be as per manufacturer's recommendation of pipe full of water, with minimum safety factor of 5.
 2. Isolate pipe supported by clamps or hooks from supports and building construction with

TECHNICAL SPECIFICATIONS

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felt.

3. Clamps shall not anchor piping, unless anchoring is required.
4. Supports from overhead construction: In accordance with truss manufacturers details. If details not provided, submit a proposed method for approval.
5. Supports from wall shall be steel brackets, hooks, clamps attached to wall with anchor bolts.
6. Resiliently isolate any copper piping with pipe isolators.
7. Hanger rods shall be solid mild steel in accordance with the following schedule:

2" and smaller	3/8" diameter rod
2-1/2" to 3-1/2"	1/2" diameter rod
4" to 6"	5/8" diameter rod
8. Where rod length exceeds 18", lateral bracing shall be provided at each fourth hanger. No piping shall be supported by any wire, ropes, wood, or other makeshift devices. All pipe hangers shall be black iron finish.
9. Hanger spacing shall not exceed the following:

	<u>Steel</u>	<u>Copper</u>	<u>Plastic</u>
3/4" and smaller	6 feet	5 feet	2 feet
1" to 1-1/4"	7 feet	6 feet	3 feet
1-1/2" to 2"	10 feet	8 feet	-
2-1/2" to 3"	12 feet	10 feet	-
4" to 8"	14 feet	12 feet	-

High pressure stainless steel piping, all sizes, 4 feet.
10. Support cast iron piping at no more than 5-foot intervals and at each fitting.
11. Install hanger within 12-inches of each change of direction and for each branch 5-feet and longer.
12. Adjust each hanger to carry its proper share of load.
13. Install additional supports and/or braces if, during test or normal operation, piping should sway, crawl or vibrate. Piping shall be immobile.
14. Support piping below any ductwork from wall or on trapeze with hanger rods outside of ductwork.
15. Support all piping, including valves, etc., independently of equipment; no piping weight or stress due to expansion, construction shall be transmitted to equipment. Contractor shall be responsible for proper alignment of piping at equipment in all conditions (maximum hot to minimum cold); install anchors, guides, bracing, spring supports as required. Flexible connections, expansion joints' deflections shall be always within allowable limits. Piping at equipment shall not be insulated until inspected for alignment at extreme temperature conditions.

M. Electrical Work under this DIVISION shall conform with all requirements of DIVISION 16.

TECHNICAL SPECIFICATIONS

SECTION 15050 BASIC MECHANICAL MATERIALS AND METHODS

N. Sound and Vibration Isolation:

1. Mount all air conditioning equipment on rigid galvanized structural steel bases and spring vibration isolators of minimum 97-percent efficiency (3-percent transmissibility), with built-in leveling device, mounted on ribbed neoprene sound absorbing pad.
2. Mount motors on rigid sliding base common with equipment (fans, pumps) or supported from equipment framing.
3. Sound isolate all vibrating equipment from supporting structure, using grommets (around bolts), washers, sound isolation pads.
4. Submit necessary data for each vibration isolator, including static deflection, weight loading for equipment in operation.

O. Pipe Identification:

1. Identify each piping system provided under this Work with direction of flow indicated by means of colored legends and flow areas, in accordance with OSHA requirements. Apply the markings after all cleaning and painting of piping and insulation is completed.
2. Apply identification to all exposed piping and to all piping which can be seen in ceiling or wall spaces, by means of access panels, doors, accessible ceiling systems, etc., and all exposed piping. Any piping completely concealed within nonaccessible spaces will not require identification.
3. Apply legend and flow arrows at all valves, gauges, thermometers, at all points where piping enters or leaves a wall, partition, cluster of piping, or similar obstruction, and at approximately 10-foot intervals on pipe runs. Practical variations or changes in locations and spacing may be made with specific approval of the Architect to meet specific conditions. Wherever two (2) or more pipes run parallel, apply printed legend and other markings in the same relative location so as to be in either vertical or horizontal linearity, whichever the case may be. Locate markings so as to be readily conspicuous at all times from any reasonable vantage point.
4. Pipe markings shall be "Setmark Snap-On" by Seton Nameplate Corporation. Equals by Bradley.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 15150 VALVES AND COCKS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work in this Section:

1. Valves.
2. Cocks.
3. Provide incidental items not shown or specified that belong to the Work described or are required for complete systems.

B. Related Work in Other Sections: Control valves.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Valve schedule:

1. Domestic hot and cold water, and compressed air: 2-inches and smaller.
 - a. Ball Valves:
 - 1) Red/White Figure 5044F, threaded end (full port).
 - 2) Red/White Figure 5049F soldered end (full port).
 - b. Check Valves:
 - 1) Red/White No. 236T, horizontal swing check threaded end.
 - 2) Red/White No. 237T, horizontal swing check soldered end.
2. Natural Gas: U/L, AGA approved plug type gas cock.
3. Gauge Cocks: Red/White 5044F.
4. Relief Valves: Iron or bronze bodies with bronze trim, ASME, flanged on sizes 2-1/2-inches and larger, 250-pound USA Bailey, Crosby, Kunkle or equal, of size and capacities required by equipment.
5. Approved manufacturers are: Red & White, Nibco, Stockham, Jenkins, Walworth, Grinnel, or Kennedy.

PART 3 – EXECUTION

3.01 INSTALLATION

TECHNICAL SPECIFICATIONS

SECTION 15150 VALVES AND COCKS

- A. All piping systems shall have valves at points for complete isolation of equipment, pumps, automatic valves and arranged so as to give complete and regulating control of piping systems throughout the system. Install valves with neat appearance and grouping and accessible, so that all parts are easily accessible for maintenance.
- B. Valves and trim shall be as recommended by the manufacturer for the service and pressure with which valve is to be installed. Special attention shall be paid to high pressure system valves, etc. Valve working pressure shall exceed test pressure.
- C. Provide manual air vent valves at all high points in the water lines as shown and as required to vent the system.
- D. Use butterfly or ball valves except where clearances restrict their use.
- E. Valves shall be same size as line in which installed.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 15250 INSULATION

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work in this Section:

1. Pipe Insulation:
 - a. Domestic hot water supply piping;
2. Supply air, return air, outside air ductwork and plenum insulation.
3. Provide incidental items not shown or specified that belong to the Work described or are required for complete systems.

B. Related Work in Other Sections:

1. Structure insulation.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Concealed Duct Insulation: Cover concealed conditioned supply air ductwork with glass fiber duct wrap, having minimum thermal resistance of 0.30 per degree F/BTUH/inch at 75-degrees F mean temperature and aluminum foil, skim-kraft vapor barrier facing. 1½" thick, .75 lb/cu. ft. Owens Corning All Service Foil Faced Duct Wrap Insulation. Insulation applied to the exterior surface of ducts located in buildings shall be legibly printed "flame spread of not more than 25 and a smoke-density not exceeding 50" when tested a composite installation, including insulation, facing materials, tapes and adhesives as normally applied.
- B. Duct Liner: Rectangular supply, outside air, and return air ductwork where shown or called for on drawings shall be internally lined with glass fiber duct liner, having erosion-resistant and flame-retardant neoprene coating, and having a minimum thermal resistance of 0.23 per degree F/BTUH/inch at 75-degrees F mean temperature, with minimum sound absorption coefficient of 0.63 at 500-cps base on test method ASTM C42366. Minimum of 1-inch thick, Owens Corning Duct Liner or equal. Duct sizes on drawings are net.
- C. Pipe Insulation:
 1. Insulate piping with Owens Corning ASJ/SSL-II insulation:
 - a. Thickness:
 - 1) Domestic Hot Water:
1½-inch and smaller 1-inch
 - b. The insulation shall have a factory applied vapor barrier jacket. Make application on clean, dry pipe with all joints butted firmly together. Seal longitudinal laps with approved vapor barrier adhesive. Wrap butted joints with 4-inch strip of vapor barrier jacket cemented with vapor barrier adhesive.

TECHNICAL SPECIFICATIONS

SECTION 15250 INSULATION

- c. Insulate all fittings by wrapping metered section of pipe insulation or fiberglass blanket to slightly greater thickness than adjoining pipe insulation. Cover fittings and couplings with "Zeston" molded fiberglass covers.
- 2. Insulation Inserts: Where insulation supports weight of pipe, install between pipe and hanger, a rigid support 9-inches long, with vapor barrier jacket attached.
- D. Acceptable manufacturers are Owens Corning, Manville, CertainTeed, or Knaufl.
- E. Submit samples of all insulation with submittal.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. General: Install all insulation in accordance with manufacturer's published instructions. Surfaces being insulated shall be clean, smooth and dry.
- B. Duct Lining:
 - 1. For velocities up to 1,500-fpm, apply insulation with adhesive. Ducts over 24-inches wide or deep shall have duct liner secured with welded studs or mechanical fasteners on 12-inch centers in addition to adhesive. Coated side of duct liner must face airstream. Heavily coat exposed edges of liner with adhesive.
 - 2. For velocities from 1,500- to 5,000-fpm, install liner according to manufacturer's recommendations utilizing either ship lap joint of rolled edge construction for mechanical fasteners.
- C. Exhaust Ducts: Do not insulate exhaust ducts, except as noted.
- D. Stapling: If stapling is used during installation, use non-corroding type.
- E. Exposed fiberglass will not be allowed.
- F. All insulation work to be performed by an independent insulation contractor.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 15300 FIRE PROTECTION

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Provide complete and operative Automatic Sprinkler System as specified, with piping connection to water service as required in accordance with the requirements of NFPA 13 and 24. Contractor shall assume full responsibility for system design, approval, and installation. The scope of this project is to fully sprinkler the new addition and retrofit the existing building.

1.02 SUBMITTALS

- A. Shop Drawings: Submit shop drawings as per GENERAL and SPECIAL CONDITIONS before fabrication or ordering materials. Include the following:
 - 1. Sprinkler installation drawings for wet pipe and freeze protected systems.
 - 2. Connections to water service.
 - 3. Catalog cuts of materials.
 - 4. Hydraulic calculations.
- B. Approval: Submit complete set of shop drawings to the Carson City Fire Department for approval, prior to submitting to Architect and installation.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Sprinkler Heads: All sprinklers shall be Underwriters Laboratories, Inc. approved.
- B. Hangers and Supports: NFPA 13.

PART 3 – AUTHORITY

3.01 INSTALLATION

- A. Installation shall conform to the latest editions of NFPA 13.
- B. Installation shall be by a State Licensed Fire Protection Contractor in compliance with Section 607 of the State Fire Marshal's regulations, Type G.
- C. Design drawings and design calculations shall be signed by a NICET Level 3 Technician or stamped by a Nevada licensed fire protection engineer and so indicated.

PART 4 – EXECUTION

4.01 FABRICATION AND INSTALLATION

- A. In accordance with Standards of National Fire Protection Association.

4.02 TESTS

TECHNICAL SPECIFICATIONS

SECTION 15300 FIRE PROTECTION

- A. Hydrostatic test at 200-psig minimum for four (4) hours for all work, in accordance with NFPA 13.
- B. Hydrostatic tests and flushing of underground systems shall be witnessed by the State Fire Marshal.

4.03 HANGER RODS

- A. Mild steel in accordance with the following schedule:

<u>MATERIAL</u>	<u>PIPE SIZE</u>	<u>HANGER ROD SIZE</u>	<u>CENTER TO CENTER</u>
Steel	2-inch and smaller	3/8-inch diameter	8-feet
Steel	2½-inch to 3-inch	1/2-inch diameter	10-feet
Steel	4-inch to 6-inch	5/8-inch diameter	14-feet

4.04 PIPE SLEEVES

- A. Adjust-O-Crete, A.M.I. Products, or equal, 24-gauge, electrogalvanized steel, adjustable sleeve.

4.05 ESCUTCHEONS

- A. Chromium-plated floor and ceiling plates with set screws to hold securely in place. Provide on pipes passing through exposed ceiling, floors, and walls in visible locations.

4.06 SPRINKLER HEADS

- A. General: Protect sprinklers in areas subject to physical damage with approved wire guards.
- B. Recessed Heads in Finished Ceilings: Reliable Semi-recessed F1FR chrome plated.
- C. Upright Heads (Concealed or in Rooms Without Ceiling): Reliable F1FR.
- D. Horizontal Sidewall: Reliable F1FR chrome plated.

4.07 GENERAL

- A. A certificate of registration in accordance with Section 608 of the Nevada State Fire Marshal's Regulations is required for the licensee's supervisor of installation.
- B. Sprinkler densities and available water pressures shall be determined by the contractor.
- C. Design shall include that required for seismic protection and freeze protection.
- D. A sprinkler cabinet with spare heads and a wrench shall be furnished in accordance with NFPA.
- E. Plastic piping in the building will not be acceptable.
- F. 1" grids are not acceptable.
- G. All piping in finished rooms shall be concealed.

TECHNICAL SPECIFICATIONS

SECTION 15300 FIRE PROTECTION

- H. Rooms with elevated ambient temperatures shall have high temperature heads.
- I. Unheated rooms or areas shall be protected with glycol loops.
- J. Work shall include coordination with other trades to insure that space allocations are shared.
- K. Coordinate all exposed sprinkler piping with Architect.
- L. Velocities shall not exceed 30 FPS.

4.08 BACKFLOW PROTECTION

- A. Zone of reduced pressure type at each anti-freeze loop. Provide drain from BFP to an approved disposal point. Provide expansion tank as required to accommodate thermal expansion. The reduced pressure principle assembly shall be a Wilkins Model 975 XL.
- B. Provide a spring loaded double-check detector assembly on each fire sprinkler riser conforming with "FCCCHR of USC." Wilkins Model 350 DA.
- C. All backflow devices shall be UL, FM, USC and State of Nevada Health Division approved.

4.09 SYSTEM SUPERVISION

- A. Flow Detector Alarm Switch:
 - 1. Water Flow Alarm: Provide in each sprinkler system connected to U/L listed central station supervisory alarm.
 - 2. Supervision of all valves connected to U/L listed central station supervisory alarm if not shown or called for in Electrical Section.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 15440 PLUMBING FIXTURES

PART 1 – GENERAL

1.01 GENERAL

- A. The Conditions of the Contract (General, Supplementary and other Conditions) and the General Requirements (Sections of Division 1) are hereby made a part of this Section.

1.02 WORK INCLUDED

- A. Furnish all materials and labor necessary to complete the installation of Plumbing Fixtures as indicated, specified herein or both. The Work of this Section includes, but is not necessarily limited to the following:
 - 1. Fixtures;
 - 2. Trim;
 - 3. Floor drains and floor sinks;
 - 4. Provide incidental items not shown or specified that belong to the Work described or are required for complete systems.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. See Schedule on Drawings.
- B. All fixtures and trim shall conform to the latest Water Conservation Standards, 1.6 G.P.F. for water closets and 1.0 G.P.F. for urinals. 2.5 G.P.M. shower heads, .5 G.P.M. self closing lavatory faucets and 2.5 G.P.M. flow restrictors on all sinks and hose bibbs.
- C. All handicap fixtures shall conform to the latest ADA Standards.
- D. Acceptable fixtures shall be American Standard, Kohler, Eljer.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Provide polished chrome-plated brass lavatory stops, supplies, tailpieces, traps, trap arms and escutcheons.
- B. Each fixture supply shall have a stop.
- C. Install fixtures in accordance with manufacturer's recommendations except where shown. Mounting height and exact location shall be as shown on the Architectural drawings. Handicap fixtures shall be installed in accordance with ADA requirements and details.
- D. Install equipment in accordance with manufacturers recommendations.
- E. Seal behind all wall hung plumbing fixtures with white sealant.

TECHNICAL SPECIFICATIONS

SECTION 15440 PLUMBING FIXTURES

- F. Fixtures shall be hung, supported or set with brass bolts or screws of sufficient length to securely fasten fixture to backing, wall or closet ring.
- G. Heads and nuts of bolts exposed at fixtures shall have chromium-plated finish. All exposed supported brackets shall be enamel painted to harmonize with fixtures.
- H. Fixtures set against metal stud walls shall have their hangers secured to metal backing plate. Metal backing plate shall be installed at the time the rough piping is installed, and shall be steel plate, 3/16-inch thick, and not less than 8-inches wide. Plate shall be attached to studs at each end of plate, and to each stud which it passes (but in no case less than three studs). Plate shall be attached by bolting with not less than two 1/4-inch "U" bolts per stud with bolts through plate and around flange of stud, or by welding with a 1/8-inch fillet weld across full width of flange at top and bottom of each plate.
- I. Adjust all self-closing faucets to close in 10 to 15 seconds.
- J. Install Scald-Gard (or equal) protection on p-trap and hot water supply for all lavatories and handicap accessible sinks.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 15855 EQUIPMENT

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Natural Gas Fired Make up Air Unit with Evaporative Cooling;
- B. Packaged AC Units;
- C. In-line Exhaust Fans;
- D. Vibration Isolation.

1.02 Related Work in Other Sections:

- A. Insulation other than factory furnished with equipment.
- B. Section 15850 Air Cooled Condensers

PART 2 – PRODUCTS

2.01 MATERIALS

- A. See Schedule on drawings for capacities and accessories.
- B. Natural Gas Fired Make Up Air Unit with Evaporative Cooling:

1. Summary:

- A. Section Includes: Provide unit with LP gas fired and evaporative cooling and ventilating sections, designed for outdoor installation. Units shall be packaged makeup-air units.
- B. Related Sections:
 - 1. Division 15 Heating, Ventilating, and Air-Conditioning (HVAC)
 - 2. Division 16 Electrical
- C. Refer to Division 16 Sections for the following; not Work of this Section:
 - 1. Power supply wiring from power source to power connection on unit. Include starters, disconnects, and required electrical devices, except where specified as furnished, or factory installed, by manufacturer.

2. REFERENCES

- A. Air-Conditioning and Refrigeration Institute (ARI):
 - 1. ARI 410 Forced-Circulation Air-Cooling and Air-Heating Coils
- B. National Fire Protection Association (NFPA)
 - 1. N90A Standard for the Installation of Air-Conditioning and Ventilating Systems
- C. Underwriter Laboratories (UL):
 - 1. 181 Standard for Safety Factory-Made Air Ducts and Connectors

3. SUBMITTALS

TECHNICAL SPECIFICATIONS

SECTION 15855 EQUIPMENT

- A. General: Submit in accordance with Section 01500 - Submittal Procedures, Shop Drawing submittals shall include:
 - 1. Manufacturer's technical product data, including rated capacities of selected model clearly indicated, motor data, fan operating curve, outlet sound power readings for eight octave bands, furnished accessories, installation and start-up instructions.
 - 2. Manufacturer's shop drawings indicating dimensions, duct connections and corner weights. Drawing views include elevation view, plan view, end view, and footprint view.
 - 3. Manufacturer's electrical requirements for power supply wiring for units. Submit manufacturer's ladder type wiring diagram for power and control wiring. Factory wiring and field wiring shall be clearly differentiated.
 - B. Installation and Operation Manual: Submit in accordance with requirements of Section 01730, operation and maintenance manuals for items included under this Section.
 - C. Warranty: Submit in accordance with requirements of Section 01740, warranties covering the items included under this Section.
4. QUALITY ASSURANCE
- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of equipment, of types and sizes required, and whose products have been in satisfactory use in similar service for not less than 5 years.
 - B. Manufacturer's Testing: All units shall be tested for proper operation in accordance with ETL listing prior to shipping.
5. DELIVERY, STORAGE, AND HANDLING
- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer, material, and products included.
 - B. Storage: Store materials in a dry area indoor, protected from damage, and in accordance with manufacturer's instructions.
 - C. Handling: Handle and lift units in accordance with the manufacturer's instructions. Protect materials and finishes during handling and installation to prevent damage. Follow all safety warnings posted by the manufacturer. Lift and support the unit with manufacturer's designated lifting or supporting points.
6. WARRANTY
- A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

TECHNICAL SPECIFICATIONS

SECTION 15855 EQUIPMENT

1. The warranty of this equipment is to be free from defects in material and workmanship for a period of one year from the purchase date. Units or parts which prove defective during the warranty period will be replaced at our option when returned to our factory, transportation prepaid.
2. Motor Warranty is warranted by the motor manufacturer for a period of one year. Should motors furnished by us prove defective during this period, they should be returned to the nearest authorized motor service station.

7. MAINTENANCE

- A. Refer to Manufacturer's Installation, Operation and Maintenance Manual (IOM) for maintenance procedures.

PRODUCT:

8. MANUFACTURER

- A. Greenheck, PO BOX 410, Schofield, Wisconsin 54476. Phone (715) 359-6171. Fax (715)355-2399. Website: www.greenheck.com

9. CABINET

- A. Construction: Double Wall. Exterior panels shall be 18 gauge G90 galvanized steel using internal frame design. Base rails shall be 12 gauge G90 galvanized steel.
- B. Internal Insulation: Insulation shall be in accordance with NFPA 90A and tested to meet UL 181 erosion requirements.
 1. Unit shall have one inch of 1.5lb-density fiberglass duct-liner insulation mechanically fasted to casing without damaging cabinet and without causing air leakage when applied as recommended by manufacturer.
- C. Exterior Unit Coating: Unit shall be protected by G90 galvanized steel.
- D. Weatherization: Unit shall top panels shall be a standing seam for positive weather protection. Metal to metal surfaces exposed to the weather shall be caulked. Access panels shall have door seals.
- E. Access: Components shall be accessible through removable doors.
- F. Unit Arrangement: Unit shall be arranged in the horizontal position.
- G. Discharge Arrangement: Unit shall have a vertical air discharge.

10. SUPPLY AIR FAN

- A. Fan: Double width, double inlet, forward curved centrifugal fan; statically and dynamically balanced, mounted on ground and polished steel fan shafts with permanently lubricated ball bearings. Bearings shall be selected for a minimum L10 life in excess of 100,000 hours at maximum cataloged speeds.

TECHNICAL SPECIFICATIONS

SECTION 15855 EQUIPMENT

- B. Motor: Motor shall be permanently lubricated, heavy duty type, matched to the fan load, and shall have premium efficiency, with an ODP enclosure. Motor shall be mounted on an adjustable slide base.
- C. Drives: V-Belt drive sized for a minimum of 150% of driven horsepower. Pulleys shall be cast and have machined surfaces. Motor sheave shall be adjustable.
- D. Mounting: Fan and motor shall be mounted on a common base and internally isolated using neoprene isolators.
- E. Air Flow Arrangement: Air flow into the unit shall be 100% outdoor air only.

11. DIRECT FIRED BURNER

- A. Description: Factory assembled, piped, and wired direct gas-fired system shall be 92% efficient and shall have a draw through design and field adjustable burner baffles with a direct spark ignition system. Sight window for viewing burner operation shall be installed in blower cabinet.
- B. Burner: Cast aluminum manifold and stainless steel mixing plates. No air from the inside space shall be allowed to pass across the burner at any time. Burner control shall have a digital coded fault indicator capable of storing the last five faults. Flame rectification shall be provided by a flame rod.
- C. Fuel: Natural gas with a maximum rated inlet gas pressure of 11" w.c.
- D. Temperature Control: Temperature control shall be provided by an electronic 25:1 turndown-ratio modulating discharge air sensor.
- E. Safety Controls:
 - 1. Manual Reset, High Limit Switch: Main gas valve closes if high-limit temperature is exceeded.
 - 2. Dual safety shutoff valves shall be provided that use 120 VAC control signals.

12. EVAPORATIVE COOLER

- A. Evaporative cooling media. Media shall be high efficiency counter flow media a minimum of 12" in depth with a minimum of 90% evaporation effectiveness equal to Munters "CELdek". Media support frames and sump shall be constructed of stainless steel. System shall include circulation pump and water make up float.

13. UNIT OPTIONS

- A. Damper: Low-leakage inlet damper. Upon loss of power or unit shutdown, damper shall close.

14. ELECTRICAL OPTIONS

- A. Control Center: Contains magnetic motor starters, 24 VAC control transformers,

TECHNICAL SPECIFICATIONS

SECTION 15855 EQUIPMENT

integral master disconnect switch, fuse blocks, and other required components to accomplish control functions.

- B. Heating Inlet Air Sensor: Automatically turns the heat on and off based on a field adjustable set point.
- C. Cooling Inlet Air Sensor: Automatically turns the evaporative cooler on and off based on a field adjustable set point.
- D. Freeze Protection: Automatically shuts down the supply fan when the discharge temperature is below the field adjustable set point beyond the field adjustable period of time.

15. CONTROLS

- A. Factory wired connection for control power supply. Factory supplied temperature control panel shall include components required to operate with the building DDC control system.

16. CURB

- A. Description: 12" high, insulated, G90 galvanized steel.

17. MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's product data, including technical bulletins, product catalog installation instructions.

18. EXAMINATION

- A. Examine areas to receive make-up air (MUA) units. Notify the Engineer of conditions that would adversely affect installation or subsequent utilization and maintenance of MUA units. Do not proceed with installation until unsatisfactory conditions are corrected.

19. PREPARATION

- A. Ensure concrete support pad is square, accurately aligned, correctly located, and in tolerance.
- B. Ensure duct is plumb, sized correctly, and to proper elevation above grade. Install duct as specified in Air Distribution (Division 15).
- C. Ensure installation location has proper support to handle weight of the make-up air unit.

20. INSTALLATION

- A. Install the MUA unit system according to the Installation, Operation and Maintenance Manual (IOM) and contract drawings.
- B. Install MUA units in accordance with manufacturer's instructions

TECHNICAL SPECIFICATIONS

SECTION 15855 EQUIPMENT

21. SYSTEM STARTUP

- A. Refer to Installation, Operation, and Maintenance Manual (IOM).

22. CLEANING

- A. Clean as recommended by manufacturer. Do not use material or methods that may damage finish surface or surrounding construction.

23. PROTECTION

- A. Protect installed product and finished surfaces from damage during construction
- B. Protect installed make-up air units to ensure that, except for normal weathering, make-up air units will be without damage or deterioration at time of substantial completion.

C Packaged Gas/Electric HVAC Unit

1. General: All units shall be factory assembled, piped, internally wired and fully charged with R-134a. Units shall have supply and return air duct connections off side of unit. Each shall have a weather-resistant steel cabinet with baked-on enamel finish. Each shall be rated in accordance with ARI Standards 210, 240 and 270. Each shall have a minimum SEER of 13.0 and 82% AFUE. UL listed and C.S.A. certified and labeled accordingly.
2. Compressor System: The unit shall contain a single or dual hermetic compressor(s). Compressors shall have internal pressure relief, low pressure cutout protection, sump heat and internal line break overload protection. Each refrigerant circuit shall include liquid and gas line service tap ports, liquid line filter dryer and factory-furnished Puron Refrigerant charge R410A.
3. Condenser Section: The condenser (outdoor) coil shall be constructed of aluminum bonded to seamless tubes. There shall be a single-speed, direct drive, vertical air discharge outdoor fan. The unit shall, as factory shipped, cycle on fan motor off for low ambient cooling down to 25 degrees F outdoor temperature.
4. Evaporator Section: The evaporator (indoor) coil shall be constructed of aluminum plate fins mechanically bonded to seamless copper tubes. The evaporator coil shall have two circuits with expansion valves for refrigerant flow control and be equipped with an evaporator defrost control. Evaporator (indoor) blower shall be centrifugal type, forward curved and belt driven by a motor with an adjustable pitch pulley.
5. System Controls: System controls shall include condenser fan, evaporator fan and compressor contractors, and a low voltage control transformer.
6. Filters: Throwaway filters shall be 2-inch low velocity Farr 30/30 or equal.
7. Carrier No Exceptions.

D In-Line Exhaust Fan

TECHNICAL SPECIFICATIONS

SECTION 15855 EQUIPMENT

1. Duct mounted supply or exhaust shall be of the centrifugal belt driven in-line type. The fan housing shall be of the square design constructed of heavy gauge galvanized steel and shall include square duct mounting collars.
2. Fan construction shall include two removable access panels located perpendicular to the motor mounting panel. The access panels must be of sufficient size to permit easy access to all interior components.
3. The fan wheel shall be centrifugal backward inclined, constructed of aluminum and shall include a wheel cone carefully matched to the inlet cone for precise running tolerances. Wheels shall be statically and dynamically balanced.
4. Motors shall be heavy duty ball bearing type, carefully matched to the fan load and furnished at the specified voltage, phase and enclosure. Motors and drives shall be mounted out of the airstream. Motors shall be readily accessible for maintenance.
5. Precision ground and polished fan shafts shall be mounted in permanently sealed, lubricated pillow block ball bearings. Bearings shall be selected for a minimum (L50) life in excess of 200,000 hours at maximum cataloged operating speed.
6. Drives shall be sized for a minimum of 150% of driven horsepower.
7. Pulleys shall be of the fully machined cast iron type, keyed and securely attached to the wheel and motor shafts.
8. Motor pulleys shall be adjustable for final system balancing. A NEMA 1 disconnect switch shall be provided as standard. Factory wiring shall be provided from motor to the handy box.
9. All fans shall bear the AMCA Certified Ratings Seal for both sound and air performance.
10. Each fan shall bear a permanently affixed manufacturer's nameplate containing the model number and individual serial number for future identification.
11. Warranty- Any units or parts which prove to be defective during the one year warranty period will be replaced when returned to the factory or authorized motor service station, transportation prepaid.
12. Fans shall be Greenheck or Cook.

E. Vibration Isolation:

1. All power drive equipment shall be quiet in operation and be free of vibration. Construct and brace metal partitions, ducts, sheet metal housings, etc., so that there will be no vibration or rattling when the system is in operation. Design and construct connections to the equipment so that noise and vibration will not reach the conditioned area through conduit, ducts, or piping. Isolators shall be supplied by a single manufacturer to the contractor. The isolator supplier's submittal shall include the complete design of the supplementary bases, a tabulation of the design on the isolators including o.d., free, operating and solid heights of springs. Isolation equipment shall be Kinetics, Mason or

TECHNICAL SPECIFICATIONS

SECTION 15855 EQUIPMENT

Vibrex. All HVAC equipment shall be anchored to resist earthquake motion for Horizontal = 1.0 G, and Vertical = 0.33 G.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. All selections of equipment shall be made based on published manufacturer's ratings and corrected for operation at altitude.
- B. All fan to duct connections shall be made with airtight flexible connector to prevent transmission of equipment vibrations.
- C. Any damage to equipment shall be repaired or replaced to bring equipment to original condition at no cost to Owner.
- D. Provide all additional steel supports, isolation, etc., as required to support and isolate equipment.
- E. All controls or accessories shipped separately shall be installed at no additional cost.
- F. Equipment shall be installed in strict conformance with manufacturer's printed instructions. If a problem with the installation is encountered, inform Architect prior to installation.
- G. All equipment shall bear a third party testing and approval label to meet OSHA requirements.
- H. All major equipment shall be started, tested, and adjusted to peak performance by a factory authorized technician. Submit test and approval reports to the Architect.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 15890 DUCTWORK

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Ductwork in this Section:
 - 1. Ductwork, apparatus, casings and plenums.
 - 2. Dampers, turning vanes, outside air intakes, filters, access doors, flexible connectors, louvers and backdraft dampers.
 - 3. Provide all incidental items not shown or specified that belong to the work described or are required for complete systems.

PART 2 – PRODUCTS

2.01 MATERIALS:

- A. Low pressure ducts: Round and rectangular supply air ducts, return air ducts, exhaust ducts, outside air ducts shall be fabricated from galvanized steel in conformance with SMACNA Standards. Ductwork shall be constructed for 2-inch W.C.
- B. Vehicle and welding exhaust ducts: Round ducts shall be fabricated from galvanized steel in conformance with SMACNA Standards. Ductwork shall be constructed for 6-inch W.C.
- C. Flexible Connections: At all duct connections to fans, and where indicated, furnish and install heavy flexible **insulated** connection 6" minimum in length. Material used for flexible connections shall be Ventfab as manufactured by Ventfabric Inc. of Chicago, Illinois, "Metal-Fab" manufactured by Duro-Dyne of California or approved equal.
- D. Flexible duct shall be Thermaflex M-KE or approved equal conforming to UL 181, Class 1 requirements, maximum length 5 feet. Furnish sample.
- E. Duct and Plenum Sealer: Water based vinyl acrylic duct sealant equal to Design Polymeric DP1010.
- F. Duct Access Doors: Doors shall be provided with hinges, cam latches, 3/4-inch glass fiber insulated core with felt sealing strips, size 12-inch by 12-inch, Ventlok No. 205.
- G. Turning vanes shall be single thickness with trailing edge.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. General:
 - 1. Ducts shall be installed in accordance with SMACNA "Low Velocity Duct Construction Standards".

TECHNICAL SPECIFICATIONS

SECTION 15890 DUCTWORK

2. Ducts shall be constructed and installed as to be completely free from vibration under all conditions of operation.
3. Supports shall be attached only to structural framing members and concrete slabs. Where supports are required between structural framing members, suitable intermediate metal framing shall be provided.
4. Supports for horizontal round ducts shall be galvanized strap or angle hangers.
5. Under no conditions shall the hangers or supports pierce the ducts. The hangers shall be double bolted to standing seams or bracing or be looped continuously around the duct and be blind riveted or sheet metal screwed to its sides and bottom. The hangers shall be attached to the building structure by bolting to concrete inserts, beam clamps or clips as required.
6. Elbows shall be made for an easy flow of air, for minimum friction, with inside radius not less than width of duct. Where space does not permit this radius, square elbows with turning vanes shall be used (all systems).
9. Resilient material gaskets shall be installed between all connections of sheet metal to coils and filter casings and connections of aluminum and steel, and shall be airtight.
10. Access doors shall be provided in sheet metal ducts for access to all control dampers.
11. All fan connections to the ducts or housing, both inlet and discharge, shall be made with waterproof, fire retardant, neoprene-coated glass fabric flexible duct connections shall be held in place with a heavy metal iron securely attached to eliminate leakage and installed to permit easy removal by the use of a screwdriver.
12. Provide galvanized steel weather cover over top of all flexible connections outdoors.
13. This contractor shall provide any additional balancing dampers as requested by balance contractor.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 15932 AIR INLETS AND OUTLETS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK:

- A. Extent of air outlets and inlets work is indicated by drawings and schedules, and by requirements of this section.
- B. Types of air outlets and inlets required for project include the following:
 - 1. Ceiling air diffusers.
 - 2. Registers and grilles.
- C. Refer to other Division-15 sections for ductwork and duct accessories required in conjunction with air outlets and inlets; not work of this section.
- D. Refer to Division 15955 for balancing of air outlets and inlets; not work of this section.

1.03 QUALITY ASSURANCE:

- A. Manufacturer's Qualifications: TITUS is used as basis of quality and design. Type, including perforated distribution plates, and performance requirements are scheduled on the drawings. Equals by KRUEGER and PRICE will be acceptable based upon the following criteria for codes and standards and submittals.
 - 1. Codes and Standards:
 - a. ISO Compliance: Test and rate air outlets and inlets in accordance with ISO Standards 5219 and 3714.
 - b. NFPA Compliance: Install air outlets and inlets in accordance with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".

1.04 SUBMITTALS:

- A. Product Data: Submit manufacturer's technical product data for air outlets and inlets including the following.

Supplier shall prepare itemized list of all air supply and return outlets on a room by room basis listing the specified material as well as the proposed substitution. The list shall include the following comparisons based on actual room physical features:

- 1. Model number with technical data sheets for each different device.
- 2. Neck size and shape.

TECHNICAL SPECIFICATIONS

SECTION 15932 AIR INLETS AND OUTLETS

3. Face size.
 4. CFM.
 5. Throw of diffuser.
 6. Throw actually required for each diffuser in the specific room where it is to be installed.
 7. Terminal velocity.
 8. Terminal velocity shall be that resulting for each diffuser in the specific room where it is to be installed.
 9. NC.
 10. Pressure drop.
 11. Deflection setting for supply and return registers.
 12. Sample of each item being substituted.
 13. Submittal shall not include at least one original copy (not photocopy) of each item being submitted. Original copies shall be standard catalog data sheets of manufacturer and incorporate the testing and rating requirements of "Codes and Standards" "ISO Compliance" paragraph required above.
- B. Supplier shall prepare an overlay drawing providing all duct size changes and outlet changes suitable for contractor field use.
- C. Any substitutions resulting in unsatisfactory conditions shall be modified at no cost to the owner.
- D. Shop Drawings: Submit manufacturer's assembly-type shop drawing for each type of air outlet and inlet, indicating materials and methods of assembly of components.
- 1.05 PRODUCT DELIVERY, STORAGE AND HANDLING:
- A. Deliver air outlets and inlets wrapped in factory-fabricated fiber-board type containers. Identify on outside of container type of outlet or inlet and location to be installed. Avoid crushing or bending and prevent dirt and debris from entering and settling in devices.
 - B. Store air outlets and inlets in original cartons and protect from weather and construction work traffic. Where possible, store indoors; when necessary to store outdoors, store above grade and enclose with waterproof wrapping.

PART 2 – NOT USED

PART 3 – EXECUTION

3.01 INSPECTION:

- A. Examine areas and conditions under which air outlets and inlets are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

TECHNICAL SPECIFICATIONS

SECTION 15932 AIR INLETS AND OUTLETS

3.02 INSTALLATION:

- A. General: Install air outlets and inlets in accordance with manufacturer's written instructions and in accordance with recognized industry practices to insure that products serve intended functions. Paint all visible ductwork behind diffusers, registers and grilles flat back.
 - 1. Diffusers, registers and grilles with removable core assemblies mounted over 9 feet above floor to be complete with earthquake restraints.
 - 2. Coordinate with other work, including ductwork and duct accessories, as necessary to interface installation of air outlets and inlets with other work.
 - 3. Locate ceiling air diffusers, registers, and grilles as indicated on general construction "Reflected Ceiling Plans". Unless otherwise indicated, locate units in center of acoustical ceiling modules.

3.03 SPARE PARTS:

- A. Furnish to Owner with receipt, 3 operating keys for each type of air outlet and inlet that require them.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 15950 CONTROLS

PART 1 - GENERAL REQUIREMENTS

1.01 GENERAL

- A. The control system shall provide direct digital control (DDC) with Windows-based user interface. The manufacturer and/or his authorized representative shall be responsible for all work under this section of the specifications. Only Alerton Controls will be allowed. All Control System Equipment is to be as listed below, and installed by the local representative, who shall be recognized as an approved "Associate Dealer", and shall be as follows:

Alerton Controls Building Control Services, Inc. (775) 826-8998

No exceptions

1.02 NOT USED

1.03 HARDWARE

- A. Remote Access

- 1. The system shall have the capability for remote via the existing on site system.

- B. Controllers

- 1. Communication between global controllers and equipment controllers shall be 9600 baud minimum speed.
 - 2. All controllers (except application-specific controllers for heat pumps) shall be furnished with a minimum of 10 percent spare capacity to allow for addition of both analog and digital inputs and outputs.

- C. Site Computer

- 1. This project will not require an on site computer.

1.04 SUBMITTALS AND AS-BUILT DOCUMENTATION

- A. The submittals shall include complete written control sequences for each item of equipment requiring control. The sequences shall include all setpoints, dead-bands, throttling ranges, etc. required for successful operation of the specified equipment. The submitted sequences shall include all necessary sequencing details, whether or not those details are furnished as part of the Mechanical Engineer's written control sequences. The written control sequences, initial setpoints, dead-bands, throttling ranges, and the graphic displays shall all be reviewed and confirmed with the Engineer.
- B. After all temperature control sequences have been finalized and have been approved by the Engineer the Contractor shall provide as-built documentation which shall include written control sequences and programming flow charts. Written control sequences shall be provided both in hard copy and on cad file.

1.05 WARRANTY PERIOD SERVICES

- A. The Contractor shall provide full service for the temperature control system for a period of one year after the date of Substantial Completion. Service shall include, but shall not be limited to,

TECHNICAL SPECIFICATIONS

SECTION 15950 CONTROLS

calibration of all sensors and other control devices, adjustments to set-points, and modifications to control sequences or programming as required/desired to fine-tune and/or finalize all control sequences.

1.06 TRAINING

- A. Upon completion of work , the Temperature Control Contractor shall instruct the Owner's designated personnel on the operation of all control system software features, shall provide a complete explanation of the control sequence for each item of equipment, and shall provide instructions on the operation and maintenance of all control devices. Training time shall be a minimum of four hours.

1.07 EMCS SOFTWARE AND PROGRAMMING REQUIREMENTS

- A. Provide security/password scheme to match the existing city requirements.
- B. The Temperature Control Contractor shall program holidays into the EMCS software for the three years following the date of the installation as determined by the city.

1.08 GRAPHIC DISPLAYS

- A. All temperature set-points and all other set-points identified as adjustable shall be adjustable from the appropriate graphic displays. Set-points given in the control sequences are for initial set-up and trial of system operations. Control system shop drawings shall utilize the same (or similar) written sequences with all set-points, throttling ranges, and differentials identified. As-built drawings shall include this same information with actual set-points following start-up, testing, and adjustment.
- B. Monitored points and alarms for each system shall be shown on the displays with full color graphics and real-time data as listed below. Where indicated, graphic displays shall be dynamic (animated). All graphic displays shall be submitted to the Engineer for review and approval prior to commencing any programming for the temperature controls. Graphic displays shall be developed for a screen resolution of 800 x 600 unless otherwise agreed upon in writing.
- C. All temperatures shall be displayed with zero decimal places.
- D. All set-points which are identified as "adjustable" in the written control sequences shall be adjustable via the associated graphic displays (including deadband between heating and cooling room setpoint).
- E. All occupied mode and unoccupied mode room temperature setpoints shall have an adjustable deadband (adjustable from the associated graphic display).
- F. All displays specified to be dynamic shall depict motion (as a minimum dynamic displays shall include rotating fan wheels and rotating pump impellers).
- G. All setpoints adjustable from the graphic displays shall be programmed with the deadband on one side of the setpoint (not split evenly across the setpoint) unless otherwise specified.

TECHNICAL SPECIFICATIONS

SECTION 15950 CONTROLS

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Approved Manufacturers subject to compliance with requirements: (See Part 3 - Execution, General, 01.).

1. Alerton Inc IBEX.

2.02 MATERIALS AND EQUIPMENT

- A. General:

1. Provide a distributed processing system complete with Direct Digital Control (DDC) software. The system shall be a fully integrated package of controls and instrumentation to control all equipment, valves, fans, etc. directly without intervening conventional controls. Control system components shall be manufacturers standard as indicated through published product information, designed and constructed as recommended by the manufacturer.

- B. System Architecture:

1. The system shall be a complete stand-alone energy management and control system consisting of a state-of-the-art menu-driven technology, dynamic graphics, simple user-friendly operation completely programmable and highly modular in construction to match the cities existing system.
2. The basic elements shall be built up of standard components kept in inventory by the EMCS supplier. Components shall not require customizing other than setting jumpers and switches, adding firmware modules or software programming to perform required functions.
3. The system shall be a true distributed processing system with all software control functions to be performed by the remote field panels. Control software shall be in nonvolatile memory. System shall provide "on-line" programming by both "local" and "remote" computer terminals allowing any and all data to be changed, added, deleted, etc. from either terminal. Remote field computers shall communicate with the central processor and the terminal unit control panels.

- C. OA Temperature Sensor (TOA):

1. Sensor shall be pre-calibrated thermistor type resistance element complete with terminal housing and sensor shield.

- D. Immersion Temperature Sensors:

1. Sensors shall be similar to OA sensor, except a stainless steel well shall be included providing sensor with fluid contact and capability for sensor removal without draining system.

- E. Current sensors shall be as follows:

1. Current sensors shall be digital type and shall have the capability to transmit the actual status reading.

TECHNICAL SPECIFICATIONS

SECTION 15950 CONTROLS

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:

1. By "Alerton Technologies" by: Building Control Services Inc., or Delta by Automated Temperature Controls., no exceptions.

PART 4 - INSTRUCTION AND ADJUSTMENT

4.01 ADJUSTMENT

- A. Adjust and validate all thermostats, sensors, controllers, relays, etc., provided and complete system validation forms attached in conjunction with Owner's representative. Provide complete 24-hour printed logs to owner for all equipment operations and system functions as part of acceptance. Thirty days prior to first year warranty anniversary date provide a duplicate series of validation logs in cooperation with owner's representative. Initial validation complete with all logs shall be included with Operation & Maintenance Manuals. Copies of all additional logs shall be furnished to Engineer at same time they are furnished to Owner.

1. Items to be logged include:
 - a. Heat Pump Loop Supply Water;
 - b. Heat Pumps;
2. Specific problem areas requested by Building Operating Engineer.
3. Copies of each log complete with analysis shall be furnished to Building Operating Personnel and Engineer within ten days from day of log.

4.02 INSTRUCTION

- A. Furnish instruction manuals covering functions and operation of control system for use by owner's operating personnel. A field instruction period lasting not less than two 4-hour days shall be provided followed by one 4-hour day approximately 30 days later.
- B. Provide control diagrams, reduced as required, diagrams shall show equipment, controls, etc., marked to correspond to identification on equipment.
- C. Control contractor shall maintain terminal and printer in his office to communicate with jobsite and for system troubleshooting, fine tuning system setpoints and assistance to owner on-site personnel.
- D. Provide vandal proof sensors on all devices exposed to public.

PART 5 - WARRANTY

5.01 GENERAL

- A. Provide one year unconditional warranty on all material, software and labor furnished and installed under this contract from date of substantial completion.
- B. Provide and install any software updates and software changes required by owner occurring during warranty period without charge.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 15955 TEST AND BALANCE

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. GENERAL: The Conditions of the Contract (General, Supplementary and other Conditions) and the General Requirements (Sections of Division 1) are hereby made a part of this Section.

1.02 SCOPE

- A. Furnish all labor necessary to provide final adjustment and balancing of HVAC air system provided under Section 15000.
 - 1. Prepare reports.
 - 2. Adjust fan drives as required including any sheaves and/or belt changes.
 - 3. Coordinate with mechanical, control and electrical contractors.
 - 4. Provide a preliminary review of design drawings and make a written report if any difficulty is anticipated in performing system balance as designed.

1.03 SUBMITTALS

A. REQUIREMENTS:

- 1. Furnish evidence that contractor is a certified member of AABC and that all procedures used shall be done in strict compliance with current AABC national standards.
- 2. Provide sample of each type of form to be used.

PART 2 – EXECUTION

2.01 GENERAL

A. Test and Balance Contractors:

- 1. Work shall be accomplished by:

Raglen System Balance, Reno, Nevada – (775)-747-0100,
RSAnalysis, Inc., Reno, Nevada – (775)-323-8866

- B. Control contractor shall have mechanic available to assist balancing contractor as required throughout the balancing process.

C. System air balance:

- 1. The system balance report shall include as a minimum, but not be limited to the following design and actual performance information:
 - a. Horsepower;
 - b. Brake horsepower;

TECHNICAL SPECIFICATIONS

SECTION 15955 TEST AND BALANCE

- c. Revolutions per minute;
 - d. Actual amperage and full load rated current of all motors and fans;
 - e. Cubic feet per minute supply, return and exhaust;
 - f. Static pressures (inlet, outlet and total external);
 - g. Temperatures across all heat exchangers (heating & cooling).
2. Filters shall be clean at time of testing.
 3. Balancing shall be accomplished in all modes of operation.
 4. After final balancing of systems, adjustments shall be made to obtain uniform temperatures and to eliminate drafts as required by actual occupancy.
 5. This contractor shall make available, if requested, a temperature recorder for "problem" zones or other areas.
 6. This contractor shall provide new drives and belts as necessary to achieve proper air balance.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 16001 ELECTRICAL GENERAL PROVISIONS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The Drawings and General provisions of the Contract including the "General Conditions", "Supplementary Conditions", and "General Requirements" of the Contract as written and referred to here are adopted and made part of Division 16.
- B. The Contract Agreement, Bidding documents, and all Addenda issued prior to Contract Agreement execution form a part of these specifications and apply to all Contracts or Subcontracts relating to the electrical systems.

1.02 SUMMARY

- A. The work under this Division shall consist of all labor, materials, equipment, services and related accessories, etc., necessary and required to complete all work as shown or inferred on the Drawings and in the Specifications (Contract Documents).
- B. Provide fixed electrical equipment, except where specifically noted otherwise.
- C. Provide portable electrical equipment for the complete system(s).
- D. Provide equipment and/or wiring normally furnished or required for complete electrical systems but not specifically specified on the drawings and/or in specifications, as though specified by both.
- E. All equipment and wiring shall be new, except where specifically shown or specified otherwise.
- F. Provide flexible electrical conduit and conductors having a slack, 90-degree bend or loop in any plane between connections at all vibration isolated equipment and the first attachment to building structure or cabinets, panels or boxes mounted thereon.

1.03 WORK INCLUDED IN THIS DIVISION

- A. Electrical work includes, but is not limited to
 - 1. Arranging and coordinating with Carson City Public Works owned utility services required as shown or specified.
 - 2. Removal or relocation of electrical services and electrical work located on or crossing through project property, above or below grade, obstructing construction of project or conflicting with completed project or any applicable code.
 - 3. Alterations and additions to existing electrical systems.

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4. Provide switchboards, panelboards, circuit breakers, power outlets, convenience outlets, switches, and/or other equipment forming part of system.
5. Complete lighting system.
6. Complete communication system.
7. Connection of all appliances and equipment including Owner furnished equipment.
8. Complete grounding system.
9. Complete temporary facilities for construction power.
10. Complete fire alarm system.

1.04 WORK NOT INCLUDED IN THIS DIVISION (REFER TO OTHER DIVISIONS OF THESE SPECIFICATIONS)

- A. Flashing of conduits into roofs and outside walls. Inform General Contractor of number and size of roof penetrations prior to bidding.
- B. Furring of building structure or finishes for conduit and equipment.
- C. Finish painting of conduit and equipment except for factory applied prime or finish painting specified for equipment, fixtures, devices or materials furnished under this section.
- D. Installation of motors except where specifically noted. See Division 15.
- E. Control wiring for mechanical systems, except where specifically indicated to be provided by Electrical Contractor. See Division 15.

1.05 RELATED WORK SPECIFIED ELSEWHERE

- A. Classification of Excavation: Division 2 – Site work.
- B. Concrete Work: Division 3.
- C. Painting: Division 9.
- D. Firestopping: Division 7.

1.06 REFERENCES

NEC:	National Electrical Code (latest edition adopted by local authorities unless otherwise noted).
NFPA:	National Fire Protection Association.
OSHA:	Occupational Safety and Health Administration.
UL:	Underwriters Laboratories, Inc.
NEMA:	National Electrical Manufacturer's Association.
IEEE:	Institute of Electrical and Electronic Engineers.
ACI:	American Concrete Institute.
ADA:	American Disabilities Act.
ANSI:	American National Standards Institutes.
ASTM:	American Society for Testing Materials.

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AWS:	American Welding Society.
FM:	Factory Mutual Insurance Association.
IBC:	International Building Code
IES:	Illumination Engineering Society.
ISA:	Instrument Society of America.
LPI	Lightning Protection Institute.
NACE:	National Association of Corrosion Engineers.
NETA:	International Electrical Testing Association.
UL:	Underwriters Laboratories.
NECA:	National Electrical Contractors Association
NETA:	National Electrical Testing Association.

1.07 ADOPTED CODES

- A. 2012 International Building Code (IBC) Published by the International Code Council (ICC).
- B. 2011 National Electrical Code (NEC) published by the National Fire Protection Association (NFPA)
- C. 2012 International Fire Code (IFC) published by the International Code Council.
- D. National Fire Codes (NFPA Standards) published by the National Fire Protection Association (NFPA) as referenced in the 2012 International Fire Code.
- E. 2009 International Energy Conservation Code (IECC) published by the International Code Council. ASHRAE/IESNA Standard 90.1-2004 is incorporated by reference.
- F. All applicable provisions of the Nevada Revised Statutes (NRS) and the Nevada Administrative Code (NAC), including those listed below.
- G. The most current regulations of the City of Carson Fire Department, Fire Prevention Division, Carson City, Nevada (Title 14).
- H. The most current edition of the Americans with Disabilities Act (ADA) published by the United States Department of Justice including the Americans with Disabilities Act Accessibility Guidelines (ADAAG)
- I. Other codes, regulations, and standards referenced in the body of this document.
- J. Local codes and ordinances do not apply to projects constructed on state-owned land, except for zoning requirements pursuant to Nevada Revised Statutes Section 278.580.

1.08 DEFINITIONS

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Provide:	Furnish, install, connect and test until complete.
Wire:	Furnish all necessary wiring, connect and test until complete.
Install:	Furnish, set in place, wire and test until complete.
Work:	Materials completely installed, connected, and tested until complete.
AWG:	American Wire Gage.
Equal:	Acceptable equal as determined by the Engineer.

1.09 REQUIREMENTS OF REGULATORY AGENCIES

- A. Obtain and pay for all permits and inspections required for the work. Comply with all ordinances pertaining to work described herein. Pay all expenses arising from the procurement of these certificates and include in the base Contract Price.
- B. Install work under this Division per drawings, specifications, latest adopted edition of the National Electrical Code, (NFPA-70) including local amendments and interpretations, Local adopted Building Codes, and any special codes having jurisdiction over specific portions of work within complete installation. In event of conflict, install work per most stringent code requirements determined by Engineer. This does not relieve the Contractor from furnishing and installing work shown or specified which may exceed the requirements of such ordinances, laws, regulations and codes.
- C. All materials, products, devices, fixtures, forms or types of construction included in this project shall meet or exceed the published requirements of National Electrical Code (NEC), American National Standards Institute (ANSI), Institute of Electrical and Electronics Engineers (IEEE) and National Electrical Manufacturers Associations (NEMA). All equipment shall bear the Underwriter's Laboratories (UL) label or equivalent from approved independent testing laboratory.
- D. Arrange, pay fees for and complete work to pass required tests by agencies having authority over work. Deliver to Engineer copies of the Certificates of Inspection and approval issued by authorities and provide original copy of each certificate to Owner.
- E. When required by law or regulations, the governmental agency having jurisdiction for inspections shall be given reasonable notice and opportunity to inspect the work. Any work that is enclosed or covered up before such inspection and test shall be uncovered at the Contractor's expense; after it has been inspected, the Contractor shall restore the work to its original condition at his own expense.

1.10 INSURANCE

- A. The Contractor shall procure and maintain, at his expense, such insurance as required by law and/or specified in the General Conditions.

1.11 DRAWINGS AND SPECIFICATIONS

- A. Drawings and specifications are complementary. Work called for by one is binding as if called for by both. Any discrepancies between drawings and

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specifications shall be brought to the attention of the Engineer for clarification during the bidding period. No allowance shall subsequently be made to the Contractor by reason of his failure to have brought said discrepancies to the attention of the Consultant during the bidding period or by reason of any error on the Contractor's part.

- B. Drawings are schematic and diagrammatic in nature. Drawings show general run of circuits and approximate location of equipment. The contractor shall review drawings of all trades to assure coordination prior to placement of work. Right is reserved to change location of equipment and devices, and routing of conduits within 10 feet, without extra cost to Owner (prior to rough-in).
- C. Use dimensions in figures, shop drawings, etc. and actual site measurements in preference to scaled dimensions. Do not scale drawings for exact sizes or locations – use dimensioned details or actual field conditions. Verify item mounting heights as required by project conditions prior to rough-in.
- D. The architectural drawings shall take precedence over all other drawings in matters of dimensions. Discrepancies between different drawings or between drawings and specifications, or regulations and codes governing the installation shall be brought to the attention of the Engineer in writing for determination.
- E. Layout equipment as shown on drawings as close as possible. Verify access requirements for equipment actually furnished, and adjust layout to comply with NEC 110. Right is reserved to change layout within 10 feet without additional cost (prior to rough-in).
- F. All devices, light fixtures, etc. located in ceiling tiles shall be located in the center of the ceiling tile UNLESS specifically noted or approved to do otherwise.
- G. The Contractor is responsible to field measure and confirm the mounting heights and location of electrical equipment with respect to counters, doorways, and other architectural, mechanical or structural work. Do not scale distances off the electrical drawings: Use actual building dimensions.
- H. Execution of Contract is evidence that Contractor has examined all existing conditions, drawings and specifications related to work, and is informed to extent and character of work. Later claims for labor and materials required due to difficulties encountered, which could have been foreseen had examination been made, will not be recognized.
- I. All work called for in this Section of the plans and specifications shall be performed under this Section, regardless of whether such work may also have been called for in other Section(s). Discrepancies in or conflicts among the various parts of the contract drawings shall not relieve Contractor of his obligation to perform.
- J. No attempt has been made to establish the required sections or splits of equipment relative to the size of access into the space, building, etc. Contractor shall establish all said splits, sections, etc. necessary to install equipment

TECHNICAL SPECIFICATIONS

complete without undue disassembly of equipment or demolition of building parts at site of work.

- K. Charges for extra work are not allowed unless work is authorized by written order from the Owner's Representative approving charges for work.
- L. Check all door swings so light switches are not located behind doors. Relocate switches as required with the Engineer's review.
- M. Elevators: The location of switches, GFCI receptacles, lights, telephone outlets, disconnect switches, fire alarm devices, etc., in elevator pits, shafts, equipment rooms shall be located as required by the Elevator Shop Drawings and applicable codes. Coordinate size and type of all electrical devices with Elevator Contractor prior to purchase of equipment.

1.12 SEISMIC QUALIFICATIONS & REQUIREMENTS

- A. Equipment Seismic Qualification
Major equipment and components shall be suitable for and certified to meet all applicable seismic requirements of the California Building Code (CBC) through zone 4 application. Guidelines for the installation consistent with these requirements shall be provided by the manufacturer and be based upon testing of representative equipment. The test response spectrum shall be based upon a 5% minimum damping factor, CBC: a peak of 2.15g's and a ZPA of 0.86g's applied at the base of the equipment. The tests shall fully envelop this response spectrum for all equipment natural frequencies up to at least 35 Hz.
- B. Structural Design Requirements
 1. Include in the bid, hiring of a structural engineer, registered in the state of Nevada, to provide calculations and details for equipment pads and mounting and bracing of all major equipment. Attach equipment according to those calculations.
 2. Major equipment and components include:
 - a) Conduit racks and supports.
 - b) Transformers.
 - c) Panelboards.
 - d) Service and Distribution switchboards.
 3. Equipment anchoring and bracing shall be designed to conform to IBC 2012 and NRS 341.143.
- C. See Spec Section 16073 Seismic Protection for Electrical Equipment.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All material shall be new, and have a UL label where available. If UL label is not available, material shall be manufactured in accordance with applicable NEMA, IEEE and Federal Standards. Use UL labeled components in assemblies that do not have overall UL label. All equipment shall comply with the terms "listed and

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labeled” as defined in the NEC 70, Article 100. Submit letter stating compliance with these requirements.

- B. Utilize one of the manufacturers listed to furnish all of the major equipment (i.e., transformers, bus duct, switchgear, circuit breakers, etc.) required for this project.

PART 3 EXECUTION

3.01 VISIT TO SITE

- A. Visit site, and survey existing conditions affecting work prior to bid. Include necessary materials and labor to accomplish the electrical work, including relocation of existing services and utilities on building site in bid. No consideration shall be given to future claims due to existing conditions. Any discrepancies or interference’s shall be reported immediately to the Engineer.

3.02 WORKMANSHIP

- A. All work performed shall be first class work in every aspect. The work shall be performed by mechanics skilled in their respective trades, who shall at all times be under the supervision of competent persons. All work shall be installed to comply with NECA’s “Standard of Installation.”
- B. Work under this Division shall be first class with emphasis on neatness and workmanship. All work shall be installed square and plumb and concealed where possible. Work that is deficient, defective, poorly laid out, not perfectly aligned, or that is not consistent with the requirements generally accepted in the trade for “first class work” will not be acceptable.
- C. In addition to the materials specified elsewhere, furnish and install all other miscellaneous items necessary for the completion of the work to the extent that all systems are complete and operative.
- D. All work under this Section shall be performed in cooperation with the work performed under all other Sections of the Specifications for the Project in order to avoid interference with other work and to secure the proper installation of all work. Refer the Drawings and Specifications covering the work to be performed under all Sections, so that the relation and extent of the work of this Section with respect to the work of all other Sections is understood. Give right of way to raceways and piping systems installed at a required slope.
- E. Install work using competent mechanics, under supervision of foreman, all duly certified by local authorities. The installation shall be subject to the Engineer’s observation, and final acceptance. The Engineer may reject unsuitable work.
- E. Conduit systems must be complete prior to installation of wiring.

3.03 CHANGE ORDERS

- A. Additional work may be required on the project which is outside the scope of the contract. Such additional work will be described in Supplemental Instructions

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and/or Clarifications, to be estimated and priced by the Contractor, and accepted by the Owner, prior to commencing work. Proposals shall include a list of quantities of all material being used with unit costs broken down into material and labor costs per unit.

- B. Material costs and labor units shall not exceed the latest edition of RS Means Electrical Cost Data.
- C. See the General Conditions of the Specifications for acceptable charges.

3.04 GUARANTEE

- A. Furnish the Owner a written guarantee, stating that if workmanship and/or material executed under this Division is proven defective within one (1) year after final acceptance by the Owner, such defects and other work damaged will be repaired and/or replaced. Submit with Operations and Maintenance Manuals.
- B. Obtain from the various manufacturers or vendors guarantees or warranties for their particular equipment or components, and deliver them to the Owner. All guarantees and warranties provided shall be referenced to this project.
- C. In event that systems are placed in operation in several phases at the Owner's request, guarantee will begin on date each system or item of equipment is accepted for service by the Owner. Provide O&M manuals for all equipment when equipment is accepted for service by the Owner.
- D. All guarantees and warranties shall include labor and material at the site of installation for the duration of the guarantee period.

3.05 OBSERVATIONS OF WORK AND DEMONSTRATION OF OPERATION (ACCEPTANCE)

- A. At all observations of work, open panel covers, junction box covers, pull box covers, device covers, and other equipment with removable plates for observation. Provide sufficient personnel to expedite cover removal and replacement.
- B. Contractor to demonstrate operation of new equipment and/or systems to satisfaction of Owner/Engineer. Contractor to have manufacturer available for demonstration of equipment and/or systems where requested by Owner/Engineer. Furnish affidavit signed by Owner's representative indicating that demonstration of operation has been performed.

3.06 COOPERATION AND COORDINATION

- A. Carefully coordinate work with other contractors and subcontractors. Refer conflicts between trades to Engineer. Provide necessary information to other trades for such coordination. Such information shall include Shop Drawings, Product Data and all other required data.
- B. Provide a system erection/coordination drawing showing electrical, HVAC, plumbing and architectural for installation in congested areas. Drawings**

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shall be in plan view for work above the ceilings and also sections shall be provided showing the elevations of conduit racks and routing and the coordination with mechanical piping and ductwork.

- C. Whenever such information is not provided in a timely manner or whenever such information is incorrect, this contractor shall bear all costs for providing or correcting affected work of related trades with no change to the Contract Price or Construction Schedule.
- D. Work to be installed as progress of project will allow. Schedule of work determined by General Contractor, Owner, and/or Architect/Engineer.

3.07 COORDINATION OF UTILITY SERVICES

- A. Drawings indicate proposed service layouts. The Contractor shall provide all concrete structures, pullboxes, vaults, trenching, raceways, protective bollards, etc., as required per NV Energy standards.

3.08 HVAC CONTROL WIRING

- A. Control Wiring including low voltage and line voltage interlock wiring will be furnished and installed under Division 15, except where specifically shown otherwise. Carefully coordinate power and control wiring interface.
- B. This Contractor shall obtain from Division 15 all wiring diagrams associated with the HVAC work and furnish all power and 120V control wiring, disconnects and starters for equipment not already packaged with these items. The Contractor shall include in his bid connections, disconnects and circuiting for all added and relocated equipment as directed by the Temperature Controls Contractor even if it is not shown on the bid documents. All wiring and conduit associated with the HVAC Temperature Control System is included under Division 15. Wiring and conduit shall comply with Division 16. All electrical work associated with the HVAC system shall be done under the supervision of Division 15.**

3.09 STARTERS

- A. Separately mounted starters are furnished and installed under Division 16 unless specifically shown otherwise. All power wiring, fuses, thermal overloads, and disconnect switches and connection of all motors is under this division. Provide the proper feeders and connections as recommended by the manufacturer of the equipment. See Spec Section 16415.

3.10 PROTECTING

- A. Provide warning lights, bracing, shoring, rails, guards and covers necessary to prevent damage or injury. All persons working around electrical equipment shall have electrical shock and flash protection per OSHA 1910.301-309 & 331-335.
- B. Do not leave exposed or unprotected, electrical items carrying current. Protect visitors and workers from exposure to contact with electrically energized surfaces, parts, etc. in accordance with OSHA standards.

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3.11 DELIVERY, STORAGE AND HANDLING

- A. Deliver equipment and materials to job site in original, unopened, labeled container. Products shall be properly identified with names, model numbers, types, grades, compliance labels and other information needed for identification. Store to prevent damage and injury. Store materials to prevent corroding. Store finished materials and equipment to prevent staining and discoloring. Store materials affected by condensation in warm dry areas. Provide heaters. Contractor shall verify the availability of on site storage space, if no on site storage space is available then the contractor shall cover the cost for off site storage. Materials stored at the project site that becomes soiled with construction dirt, concrete, or moisture shall be removed from the site and replaced with new. Do not install soiled material.
- B. Protect work and materials from damage by weather, entrance of water or dirt. Cap and mark conduit during installation.
- C. Avoid damage to materials and equipment in place. Repair, or remove and replace damaged work and materials.
- D. Protection and safekeeping of products stored on premises is responsibility of Contractor supplying products.
- E. Schedule of deliveries and unloading to prevent traffic congestion blocking of access or interference with work. Arrange deliveries to avoid larger accumulations of materials than can be suitably stored at site.
- F. Install equipment per manufacturer's recommendations. Conflicts between contract documents and these recommendations shall be referred to Engineer for remedy.
- G. Electrical or electronic equipment that has been damaged, exposed to weather or is, in the opinion of the Engineer or Architect, otherwise unsuitable because of improper fabrication, storage or installation shall be removed and replaced by this Contractor at his expense.

3.12 ANCHORS

- A. Provide anchors for all equipment, raceways, hangers, etc. to safely support weight of item involved plus 100% for dead loads. Live loads shall be considered in addition to dead loads.
- B. Anchors to consist of expansion type devices similar to "Redhead" or lead expansion anchors. Plastic anchors are not acceptable.
- C. Use preset anchor steel inserts in concrete slabs. Provide preset anchor size and type for anticipated or specified rod/bolt size and live/dead load.

3.13 CLEANING AND PAINTING

TECHNICAL SPECIFICATIONS

- A. Clean equipment furnished in this Division after completion of work. Clean wipe the interior of all conduit, pullboxes, junction boxes, outlet boxes, and panelboard backboxes, soiled with dirt and debris prior to installation of wiring.
- B. Touch-up or re-paint damaged painted finishes as determined by the Engineer.
- C. Remove debris, packing cartons, scrap, etc., from site daily.

3.14 SPARE PARTS

- A. Where spare parts are specified in the Technical Sections, furnish spare parts to Owner with itemized receipt. Contractor is responsible to deliver parts and have receipt signed by Owner's representative. Turn over receipt with as-built documents.

3.15 HOUSEKEEPING PADS

- A. Not Required

3.16 TRAINING

- A. Training for operation and maintenance of new systems or modifications to existing systems is specified in Technical sections. Contractor shall submit with record documents an itemized receipt signed by Owner's representative that all specified training has been received.

3.17 ACCESS PANELS

- A. The contractor shall furnish all access panels for walls, partitions, etc., and shall give access panel to the General Contractor for installation at locations as directed by the Electrical Contractor. It shall be the responsibility of the Electrical Contractor that access panels are provided for access to all boxes, bus joints, equipment, etc., which may be concealed by building construction to comply with the NEC and NFPA. Access panels shall be installed so as not to interfere with lighting arrangements.

END OF SECTION 16001

TECHNICAL SPECIFICATIONS

SECTION 16002 ELECTRICAL SUBMITTALS

PART 1 GENERAL

1.01 DESCRIPTION OF SUBMITTAL CATEGORIES

- A. The required submittals are defined below and specified in each section.
1. Requests for substitutions are written requests to use materials, equipment, etc., different from that specified.
 2. Shop Drawings include fabrication, layout, wiring diagrams, erection, setting, coordination, drawings and diagrams and performance data.
 3. Samples are units of work, materials or equipment items, showing the workmanship, pattern, trim and similar qualities proposed.
 4. Manufacturer's Data is standard printed product information concerning the standard portions of the manufacturer's products.
 5. Certifications are written statements, executed specifically for the project application by an authorized officer of the contracting firm, manufacturer, or other firm as designated, certifying to compliance with the specified requirements.
 6. Test Reports are specific reports prepared by independent testing laboratories, showing the results of specified testing.
 7. Industry Standards are printed copies of the current standards in the industry.
 8. Manufacturer's Product Warranties are manufacturer's standard printed commitment in reference to a specific product and normal application, stating that certain acts of restitution will be performed by the manufacturer if the product fails under certain conditions and times limits.
 9. Operating Instructions are the written instructions by the manufacturer, fabricator or installer of equipment or systems, detailing the procedures to be followed by the Owner's in operation, control and shut-down.
 10. Maintenance Manuals are the compiled information provided for the Owner's maintenance of each system of operating equipment.
 11. Maintenance Materials (spare parts) are extra stock of parts or materials for the Owner's initial use in maintaining the equipment and systems in operation.
 12. Record Drawings are accurate representations of the installed systems and wiring as recorded on a daily "as-installed" basis.
 13. Guarantees are signed commitments to the Owner that certain acts of restitution will be performed if certain portions of work fail within certain conditions and time limits.
 14. Product Data includes manufacturer's data pertaining to the products, materials and equipment of the work.
 15. Method of Procedures are detailed sequences of work required during interruption of service and/or connection to energized parts of systems requiring special sequences or protections.
 16. Training – Materials and sign-off of completion.
 17. Identification nomenclature – See section 16040.

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PART 2 PRODUCTS

2.01 PROPOSED MATERIAL MANUFACTURERS

- A. Submit to Consultant within 30 days after award of contract a complete list of proposed material manufacturers. List does not preclude submission of shop drawings. Acceptance of manufacturer on list does not constitute acceptance of specific material or equipment. If shop drawings are submitted with non approved substitutions, the contractor will pay the expense incurred by the consultant to review the shop drawings of any re-submittal.

PART 3 EXECUTION

3.01 SUBSTITUTIONS

- A. See General Conditions of the specifications for information regarding substitutions. Specified catalog numbers are used for description of equipment and standard of quality only. Equivalent material will be given consideration only if adequate comparison data including samples if requested by Engineer are provided. Alternate products shall meet or exceed design criteria.

3.02 SUBMITTAL FORM AND PROCEDURES

- A. Shop and Erection Drawings
 1. Submit shop drawings for material and equipment furnished under Division 16 of specifications, to Consultant for review within 30 days after award of contract. Shop drawings shall be submitted on timely basis to allow adequate lead time for review, re-submission if necessary, manufacture and delivery to allow access of material to project at correct time based on schedule established by Consultant/Contractor. Provide index with thumb tabs collated with Table of Contents for sections. Include complete descriptive data with dimensions, operating data and weight for each item of equipment. Carefully examine shop drawings to assure compliance with drawings and specifications prior to submittal to Consultant. **Shop drawings and submittals shall bear the stamp of approval of the Electrical Contractor as evidence that they have checked the drawings.** Drawing submitted without this stamp of approval will not be considered and will be returned for proper re-submission. All shop drawings shall be submitted as a single one time complete package. Partial packages shall not be reviewed.
 2. Submit minimum 1 electronic copy or 8 copies. Architect/Engineer will retain minimum 3 copies and return balance to Contractor. Coordinate required number of copies with General Conditions.
 3. Clearly mark each shop drawing item to correspond to drawings and specifications. Any drawings not clearly marked will be rejected.
 4. Review of shop drawings does not relieve Contractor of responsibility for errors and omissions in shop drawings. Contractor is responsible for dimensions and sizes of equipment. Inform Engineer in writing of equipment differing from that specified.
- B. "Record" Drawings

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1. One complete set of prints will be furnished to the Contractor to indicate actual location of conduit systems, outlets, and equipment. Keep set of prints on job and record day to day changes to Contract drawings with red pencil. Provide "Record" drawings as specified in the General Conditions or Division 1 of the specifications at the completion of job.
- C. Maintenance Materials
1. Submit a list of all warranties and guarantees.
 2. Submit with final close out documents a signed receipt for all maintenance materials (spare parts) specified. See Technical Sections for required materials.
- D. Product Warranties and Guarantees
1. Submit fully executed Product Warranties and Contractor Guarantees to the Owner with final close out documents.
- E. Maintenance Manuals
1. Submit to Consultant 1 electronic copy or three (3) sets of data prepared by manufacturer for each item and/or device of electrical equipment furnished in this contract completely describing and identifying equipment. Data to include serial numbers, catalog/model numbers, parts lists, description of operation, final shop drawings, wiring diagrams, all electrical ratings, set-up and maintenance procedures and other literature required for maintenance of equipment. See Technical Sections for other required information.
- F. Summary of Project Closeout Items for Owner
1. Certificates of inspection and approval from authorities having jurisdiction.
 2. Executed Guarantees and Product Warranties.
 3. "Record" drawings.
 4. Final shop drawings.
 5. Final Erection drawings.
 6. Receipt for maintenance materials (spare parts).
 7. Maintenance manuals.
 8. Receipt for keys.
 9. Completed test reports.
 10. Signed off observation and punch lists.
 11. Lien waivers.

3.03 SPECIFIC SUBMITTAL REQUIREMENTS

- A. Shop Drawings shall include, but not be limited to the following:
1. Shall be drawn to accurate scale except where diagrammatic representations are specifically indicated.
 2. Shall show clearance dimensions of critical locations and show dimensions of spaces required for operation and maintenance of equipment.
 3. Shall show conduit and conductor connections and other service connections.
 4. Shall show interfaces with other work including structural support.

TECHNICAL SPECIFICATIONS

5. Shall include complete descriptive data, with dimensions, operating data and weight.
 6. Shall indicate deviation from the contract documents.
 7. Shall explain deviations.
 8. Shall show short circuit current ratings for all electrical equipment.
 9. Shall show how deviations coordinate with portions of the work, currently or previously submitted.
- B. Review of shop drawings shall not relieve Contractor of responsibility for errors or omissions in shop drawings. Any equipment that will not fit into space shown on drawings shall be called to the attention of the Engineer in writing.
- C. Samples: Submit samples where requested by Engineer. Engineer's review of sample submittals
1. Shall be limited to general type, pattern and finish.
 2. Shall not include testing and inspection of the submitted samples.
 3. Shall not indicate complete compliance with specified requirements. Complete compliance with specifications is the exclusive responsibility of the Contractor.
- D. Manufacturer's Data
1. Where pre-printed data covers more than one distinct item, mark copy to *clearly* indicate which item is to be provided.
 2. Contractor shall delete portions of data not applicable.
 3. Contractor shall mark data showing portion of operating range required for project application.
 4. Elaboration of standard data describing a non-standard product shall be processed as a shop drawing.
 5. For each product Contractor shall include the following information summarized into a single sheet document for each product
 - a) Manufacturer's production specifications including catalog/model number.
 - b) Manufacturer's Serial Number.
 - c) Installation or fabrication instructions.
 - d) Source of supply.
 - e) Sizes, weights, speeds and operating capacities.
 - f) All electrical ratings, including temperature rating of terminals.
 - g) Conduit and wire connection sizes and locations.
 - h) All thermal ratings.
 - i) Statements of compliance with required standard and governing regulations.
 - j) Cooling requirements and makeup and/or ventilating air requirements.
 - k) Performance data, where applicable.
 - l) All sound ratings.
 - m) Other information needed to confirm compliance.
 - n) Manufacturers recommended parts list.
 - o) Other information required by Technical Sections.

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- E. Source Codes: Provide Source Code in both electronic and paper format and Source Code Licenses for all equipment that is computer driven. Provide Development licenses so Source Code can be examined, modified, and maintained. These Development Licenses, along with all software licenses shall become property of the Owner. At the discretion of the owner, third parties will be allowed to use the software as necessary, for the life of the work in this project. No encryption or other obfuscation will be allowed.
- F. Certifications: Contractor shall submit with notarized execution.
- G. Test Reports: Submit notarized test reports signed and dated by firm performing test.
- H. Manufacturer's Product Warranties: Contractor shall submit product warranties in accordance with the technical sections. Where published warranty includes deviation from required warranty, product is disqualified from use on project, unless manufacturer issues a specific project warranty.
- I. Operating Instructions required
 1. Submit manufacturer's operating instructions for each item of electrical equipment.
 2. Submit supplement with additional project application instructions where necessary.
 3. Submit specific operating instructions for each electrical system that involves multiple items of equipment.
 4. Submit instructions for charging, start-up, control or sequencing of operation, phase or seasonal variations, shut-down, safety and similar operations.
 5. All operating instructions shall be typewritten in completely explained and easily understood English language.
- J. Maintenance Manual Requirements
 1. Provide emergency instructions including addresses and telephone numbers for service sources.
 2. Provide regular system maintenance procedures.
 3. Indicate proper use of tools and accessories.
 4. Provide wiring and control diagram for each system.
 5. Provide manufacturer's data for each operational item in each system.
 6. Provide source code submittal for all software controlled equipment.
 7. Provide manufacturer's product warranties, and guarantee relating to the system and equipment items in the system.
 8. Provide Final Shop and Erection drawings relating to the system.
 9. Bind each operating and maintenance manual in one or more vinyl-covered, 2" 3-ring binders, plus pocket-folders for folded drawings. Index with thumb tab collated with Table of Contents for sections. Mark the back spine and front cover of each binder with system identification and volume number.

TECHNICAL SPECIFICATIONS

- K. Maintenance Materials: Deliver all materials to the Owner in fully identified containers or packages suitable for storage. Obtain receipt for all delivered materials signed by the Owner's Representative.
- L. Guarantees: Where indicated as "Certified", provide guarantee which, in addition to execution by an authorized officer of each guarantor, is attested to by the Secretary of each guarantor and bears the corporate seal. Submit draft of each guarantee prior to execution.

END OF SECTION 16002

TECHNICAL SPECIFICATIONS

SECTION 16003 TEMPORARY ELECTRICAL FACILITIES FOR CONSTRUCTION

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. Furnish temporary electrical facilities to provide lighting and power for construction. Temporary power must be installed in accordance with the National Electrical Code, National Electrical Safety Code, local utility, local codes and authority having jurisdiction.
- B. Coordinate temporary electrical facilities with other trades.
- C. See General Conditions, Supplemental General Conditions and Spec Section 01500, Temporary Facilities and Controls for additional information.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General: Provide new or used materials and equipment suitable for intended use. Ensure safe, adequate performance of facilities in accordance with governing regulations. Used equipment shall be in good, safe working order.

PART 3 EXECUTION

3.01 INSTALLATION AND OPERATION

- A. Except for self-contained facilities, connect and terminate temporary electrical facilities at locations required for proper distribution.
- B. Do not subject electrical facilities on either temporary work or temporary use of permanent work to excess demand or overload.

3.02 SERVICE CONNECTION

- A. Obtain temporary service from existing building site utilities. Install service in conformance with NEC 230 and 590.

3.03 GROUNDING

- A. Power service and distribution system shall be properly grounded in accordance with NEC requirements.
- B. Ground the system neutral in accordance with NEC 250.
- C. Provide feeders and branch circuits with ground wire sized per NEC 250-122.

3.04 POWER SYSTEM AND DISTRIBUTION

- A. Provide required distribution and capacity of system. Over-current protection, fusible and/or circuit breakers sized per NEC.

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- B. For 120/240 volts, single-phase system; use 3-wire 120/240-volt feeders and branch circuits.
- C. For 120/240 volt, 3 phase, 4-wire system; use 120/240 volt balanced single-phase 3-wire distribution or 120/240 volts, 3 phase, 4-wire distribution.
- D. Use No. 12 wire for branch circuits less than 100 feet to last outlet, and No. 10 wire for circuits beyond 100 feet. Install branch circuits using NEC approved wiring methods.
- E. Balance loads connected to 3 phase services within reasonable limits.

3.05 PLUG-IN RECEPTACLES

- A. Use 20A, duplex, NEMA grounded type or as required for special equipment.
- B. Branch circuits feeding receptacles shall be 20A or as required for special equipment.
- C. Provide receptacles to be reached by 50-foot extension cord.
- D. All receptacle circuits shall be protected by dynamic type ground-fault circuit interrupters, which automatically disconnect circuit when leakage current of 4-6MA is detected.
- E. Receptacles shall not be placed on the same circuit with temporary lighting.

3.06 TEMPORARY LUMINARIES

- A. Provide luminaries approved by NEC for temporary construction wiring.
- B. Lamps shall be rough service incandescent 150 watt to 300 watt equipped with guards to protect from contact and damage (sizes as directed).

3.07 LAMPS AND REPLACEMENTS

- A. Provide lamps.
- B. Replace burned out lamps to maintain required lighting levels throughout the duration of the project.

3.08 INSTALLATION OF CIRCUITS

- A. Install required lighting and receptacle circuits along a route least objectionable to construction work as determined by Contractor. Protect circuits where exposed to damage.

3.09 PERMANENT WIRING SYSTEM

- A. Do not use permanent wiring for construction without specific acceptance of the Owner. Before using permanent wiring for temporary service, submit a list of uses to the Owner. The Owner may refuse use of permanent equipment for

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temporary service. Use of permanent equipment prior to Substantial Completion shall not affect warranty period.

3.10 REMOVAL AND RESTORATION

- A. Temporary wiring shall be removed immediately upon completion of construction or purpose for which the wiring was installed. Repair or replace work damaged by temporary electrical facilities. Clean and restore permanent electrical system used to provide temporary services to condition of new and unused work.
 - 1. Electrical work installed as temporary facilities, upon removal, remains property of Installer.
 - 2. Replace lamps of permanent light fixtures used for temporary lighting that have burned out or are noticeable dim. All permanently installed fixtures in the construction area lamps shall be removed and cleaned.
 - 3. Where temporary use of lamps exceeds 50 percent of lamp life, replace lamps.
- B. At Substantial Completion, clean permanent electrical work used as temporary facilities. Remove debris accumulated in electrical spaces.

END OF SECTION 16003

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SECTION 16040 ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide and install required identification for the systems and equipment shown on the drawings and/or specified. The extent of identification is specified herein and in individual technical sections of work.
- B. Coordinate with Consultant and Owner for proper equipment identification nomenclature. Nameplates must be approved by Consultant prior to ordering and installation.
- C. Types of electrical identification include:
 - 1. Conduit labeling.
 - 2. Buried cable and conduit warnings.
 - 3. Cable/conductor identification.
 - 4. Operational instructions and warnings.
 - 5. Danger signs.
 - 6. Equipment/system identification labels and signs.
 - 7. Device plate labeling.
 - 8. Junction box labeling.

1.02 RELATED WORK

- A. Painting of conduit and color coded painting of conduit if required. See Division 9.

1.03 SUBMITTALS

- A. Manufacturer's Data
 - 1. Product specifications and installation instructions for each material and device.
- B. Samples
 - 1. Provide for each color, lettering style and other graphic representation.
- C. Labels
 - 1. Provide a list of labels with actual designations as they will be printed.

PART 2 - PRODUCTS

2.01 ELECTRICAL IDENTIFICATION MATERIAL

Conform to ANSI A13.1, Table 3 for minimum size of legend letters and minimum length of color field for each raceway or cable size. Use colors prescribed by ANSI A13.7, NFPA 70 and these specifications.

- A. Color-Coded Conduit Markers
 - 1. Manufacturer's standard preprinted, flexible or semi-rigid, permanent, plastic-sheet conduit markers, extending 360 degrees around conduits. Attach with adhesive, adhesive lap joint of marker, matching adhesive plastic tape at each end of marker, or pre-tensioned snap-on. Lettering to indicate voltage, function of conductors in conduit and shall be 8" minimum length (i.e. ac power, dc power, fire alarm).

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- B. Color-Coded Plastic Tape
 - 1. Manufacturer's standard self-adhesive vinyl tape, minimum 3 mils thick by 1-1/2" wide.
- C. Underground Plastic Line Marker
 - 1. Manufacturer's standard permanent, bright-colored, continuous-printed plastic tape, for direct-burial service; minimum 4" wide x 4 mils thick. Printing to indicate type service of cable; with large (minimum 2-1/2") high letters.
- D. Cable/Conductor Identification Bands
 - 1. Manufacturer's standard vinyl self-adhesive self laminating cable/conductor markers, wrap-around type; pre-numbered plastic coated, or write-on type with clear plastic self-adhesive cover flap, lettered to show circuit identification. Similar to Panduit "Instacode" or accepted equivalent by T&B, or Tyton. Refer to section 16123 Low-Voltage Electrical Power Conductors and Cables.
- E. Self-Adhesive Plastic Signs
 - 1. Manufacturer's standard, self-adhesive, pre-printed, flexible vinyl signs for operational instructions or warnings. Sizes suitable for application and visibility, with proper wording for application.
 - 2. Color: Orange or Yellow with black lettering.
- F. Danger Signs
 - 1. Manufacturer's standard "DANGER" signs, baked enamel finish on 20 gage steel; standard red, black and white graphics; 14" x 10" unless 10" x 7" is largest which can be applied, or where larger size is needed for visibility use recognized explanation wording (as examples: HIGH VOLTAGE, KEEP AWAY, BURIED CABLE, DO NOT TOUCH SWITCH, DANGER-STARTS AUTOMATICALLY).
- G. Engraved Signs (Nameplates)
 - 1. Use 1/8" thick melamine plastic laminate, complying with FS LP-387, sizes as indicated, engrave with standard letter style of sizes and wording indicated (1/4" letters minimum).
 - 2. Color: Black field with white letters for normal power service;
Red field, white letters for emergency/standby service;
Orange field, white letters for UPS service
 - 3. Fasteners: Self adhesive backing or double stick tape.
- H. Permanent Polyester Tape:
 - 1. Use Permanent Metalized Polyester Tapes for Industrial purposes that are resistant to oil, solvents and chemicals, these durable tapes adhere to all surface.
 - 2. DYMO #18485, Black on Silver, 3/8" wide, or equivalent.
- I. Lettering and Graphics
 - 1. Coordinate names, abbreviations and other designations used with those shown or specified. Provide numbers, lettering, and wording as indicated or required for identification and operation/maintenance.

PART 3 - EXECUTION

3.01 APPLICATION AND INSTALLATION

- A. General Installation Requirements
 - 1. Install after completion of painting.

TECHNICAL SPECIFICATIONS

2. Comply with governing regulations and requests of governing authorities for identification of electrical work.
- B. Conduit Identification
1. Use adhesive marking tape labels, Brother or Kroy labels 1" high x 12" long (min.), at 20 foot intervals to identify all conduits run exposed or located above accessible ceilings. Conduits located above non-accessible ceiling or in floors and walls shall be labeled within 3 feet of becoming accessible. Labels for multiple conduits shall be aligned. Use the following colors:
 - a. Above 600 Volts: Conduit 2" and larger - Black letters on orange background indicating feeder identification and voltage. Feeders within walls: provide identification on wall surfaces directly external to the conduits. Alternate identification labels with "DANGER - HIGH VOLTAGE" warning signs of the same color.
 - b. 600 Volt and Below Normal: Conduit 2" and larger - White letters on black background indicating feeder identification and voltage. Not required unless otherwise noted.
 - c. 600 Volt and Below Emergency: All conduit - White or black letters on red background indicating feeder identification and voltage. Not required unless otherwise noted
 - d. 600 Volt and Below UPS: All conduit - Black letters on yellow background indicating feeder identifications, circuit number and voltage. Not required unless otherwise noted
 - e. Fire Alarm: All conduit shall be manufactured red.
 - f. Temperature Control: White or black letters on blue background indicating "TEMP. CONTROL"
 - g. Ground: All conduit - White or black letters on green background indicating "GROUND" and equipment and designation.
 - h. Network Fiber: All conduit - Black letters on white background indicating "NETWORK FIBER."
 2. Where conduits enter or exit a panelboard, pull or junction box, switchboard, or other distribution equipment, conduit labels shall include circuit number in addition to feeder identification and voltage.
 3. For overhead conduits, place identification such that it can be read standing on the floor below.
- C. Underground Cable Identification
1. During back-filling of underground cable, install continuous underground marker, directly over buried line 6" to 8" below finished grade. Where multiple lines are buried in common trench not exceeding 24" width, install a single line marker. Install additional line markers for each increment of 24" width, i.e., 36" wide trench - 2 markers; 54" wide trench, 3 markers. Install multiple markers evenly spaced.
 2. Install line marker for every buried ductbank and/or conduits 3" diameter or larger.
 3. Electric Lines: Use red colored tape with lettering stating "CAUTION BURIED ELECTRIC LINE BELOW".
 4. Communication Lines: Use orange colored tape with lettering stating "CAUTION COMMUNICATION LINE BELOW".
- D. Operational Identification and Warnings
1. Provide operational signs for:
 - a. Switchgear
 - b. Large motor starters
 - c. All rotating equipment
 - d. Decommissioned equipment to read "Retired in Place."
- E. Danger Signs

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1. Provide for medium voltage switchgear, sectionalizing loop switches, etc., as shown and described herein.
 2. Provide for engine generators and other automatic equipment, i.e.: "Danger-Starts Automatically".
 3. Provide as required by codes.
- F. Engraved Plastic Laminated Signs
1. Install on each major unit of electrical equipment in the building. Provide single line of text, 1/4" high lettering on 1" high sign (1-1/2" high where 2 lines required). Matching terminology and numbering as indicated in contract documents.
 2. Provide signs for each unit of the following categories:
 - a. Electrical cabinets and enclosures: Indicate cabinet designation, voltage, phase and feeder origin.
 - b. Access panel/doors to electrical facilities: Indicate room name and use.
 - c. Major electrical switchgear: Indicate equipment designation, voltage, phase and feeder origin.
 - d. Electrical substations: Indicate equipment designation, voltage, phase and feeder origin.
 - e. Safety switches, circuit breakers and portable engine disconnects: Indicate equipment designation, voltage, phase, feeder origin and circuit number.
 - f. Transformers: Indicate transformer designation, voltages, phases, feeder origin, circuit number and equipment served.
 - g. Feeder cables inside pull and junction boxes and inside all switchgear at terminals indicating source and destination: Fasten with nylon ties.
 - h. All equipment furnished in this Division of the specifications: Indicate equipment designation, voltage, phase, feeder origin and circuit number.
- G. Install signs where indicated or most visible. Secure with at least two cadmium-plated screws. Where substrate cannot receive screws, use industrial epoxy cement to secure signs. Self-adhesive or double stick tape is acceptable. Secure with cadmium plated screws on porous surfaces.
- H. Identify all conduits installed for future use.
- I. Junction, Pull and Connection boxes. Identification of systems and circuits shall indicate system voltage and identity of contained circuits on outside of box cover. Color code shall be same as conduits for pressure sensitive labels. Use self-adhesive marking tape labels at exposed locations and indelible black marker at concealed boxes. All fire alarm boxes shall have red covers. All temperature control boxes shall have blue covers.
- J. Branch Circuit Conductors shall be identified in each junction box and pull box with wire markers as manufactured by T & B, Panduit, 3M or Ideal to indicate panel/circuit number.
- K. Junction Boxes in branch circuit wiring shall be labeled with panel and circuit numbers. Junction boxes for special systems shall be labeled with system name and other identification as directed; for example, "fire alarm-zone 1". Where boxes are installed flush mounted in finished areas or surface mounted in unfinished areas, labeling shall be with engraved plastic nameplate as specified herein. Where boxes are installed above accessible ceilings, labeling may be neat hand written lettering with indelible marker.
- L. Device Plates – switches and receptacles. Identify the panelboard and branch circuit number from which served on the front of the device plate with Permanent Polyester Clear Tape with black letters. Locate all labels at the bottom of the plate in the same location throughout.

TECHNICAL SPECIFICATIONS

END OF SECTION 16040

TECHNICAL SPECIFICATIONS

SECTION 16060 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Rod electrodes.
 2. Wire.
 3. Grounding well components.
 4. Mechanical connectors.
 5. Exothermic connections.

- B. Related Sections:
- Not Applicable.

1.02 REFERENCES

- A. Institute of Electrical and Electronics Engineers:
1. IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
 2. IEEE 1100 - Recommended Practice for Powering and Grounding Electronic Equipment.
- B. International Electrical Testing Association:
1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. National Fire Protection Association:
1. NFPA 70 - National Electrical Code.

1.03 SYSTEM DESCRIPTION

- A. Grounding systems use the following elements as grounding electrodes:
1. Metal underground water pipe.
 2. Metal building frame.
 3. Concrete-encased electrode.
 4. Rod electrode.
 5. Plate electrode.

1.04 DESIGN REQUIREMENTS

Not Applicable.

1.05 PERFORMANCE REQUIREMENTS

- A. Grounding System Resistance: 5 ohms maximum

TECHNICAL SPECIFICATIONS

1.06 SUBMITTALS

- A. General Conditions: Requirements for submittals.
- B. Product Data: Submit data on grounding electrodes and connections.
- C. Test Reports: Indicate overall resistance to ground and resistance of each electrode.
- D. Manufacturer's Installation Instructions: Submit for active electrodes.
- E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.07 CLOSEOUT SUBMITTALS

- A. General Conditions: Requirements for submittals.
- B. Project Record Documents: Record actual locations of components and grounding electrodes.

1.08 QUALITY ASSURANCE

- A. Provide grounding materials conforming to requirements of NEC, IEEE 142, and UL labeled.
- B. Maintain one copy of each document on site.

1.09 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

1.10 PRE-INSTALLATION MEETINGS

- A. General Conditions: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. General Conditions: Requirements for transporting, handling, storing, and protecting products.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.
- D. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

TECHNICAL SPECIFICATIONS

1.12 COORDINATION

- A. General Conditions: Requirements for coordination.
- B. Complete grounding and bonding of building reinforcing steel prior concrete placement.

PART 2 PRODUCTS

2.01 ROD ELECTRODES

- A. Product Description:
 - 1. Material: Copper-clad steel.
 - 2. Diameter: 3/4 inch (19 mm).
 - 3. Length: 8 feet(2.4 m).
- B. Connector: Connector for exothermic welded connection.

2.02 WIRE

- A. Material: Stranded copper.
- B. Foundation Electrodes: As shown on drawings.
- C. Grounding Electrode Conductor: Copper conductor bare.
- D. Bonding Conductor: Copper conductor bare.

2.03 GROUNDING WELL COMPONENTS

- A. Well Pipe: 8 inches NPS (DN200) by 18 inches (600 mm) long concrete pipe with belled end.
- B. Well Cover: Cast iron with legend "GROUND" embossed on cover.

2.04 MECHANICAL CONNECTORS

- A. Description: Bronze connectors, suitable for grounding and bonding applications, in configurations required for particular installation.

2.05 EXOTHERMIC CONNECTIONS

- A. Product Description: Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.

PART 3 EXECUTION

3.01 EXAMINATION

- A. General Conditions: Verification of existing conditions before starting work.
- B. Verify final backfill and compaction has been completed before driving rod electrodes.

TECHNICAL SPECIFICATIONS

3.02 PREPARATION

- A. Remove paint, rust, mill oils, surface contaminants at connection points.

3.03 EXISTING WORK

- A. Modify existing grounding system to maintain continuity to accommodate renovations.
- B. Extend existing grounding system using materials and methods as specified.

3.04 INSTALLATION

- A. Install in accordance with IEEE 142.
- B. Install additional rod electrodes to achieve specified resistance to ground.
- C. Install grounding and bonding conductors concealed from view.
- D. Install grounding well pipe with cover at each rod location. Install well pipe top flush with finished grade.
- E. Install grounding electrode conductor and connect to reinforcing steel in foundation footing as indicated on Drawings. Electrically bond steel together.
- F. Bond together metal siding not attached to grounded structure; bond to ground.
- G. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
- H. Install continuous grounding using underground cold water system and building steel as grounding electrode. Where water piping is not available, install artificial station ground by means of driven rods or buried electrodes.
- I. Permanently ground entire light and power system in accordance with NEC, including service equipment, distribution panels, lighting panelboards, switch and starter enclosures, motor frames, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.
- J. Install branch circuits feeding isolated ground receptacles with separate insulated grounding conductor, connected only at isolated ground receptacle, ground terminals, and at ground bus of serving panel.
- K. Accomplish grounding of electrical system by using insulated grounding conductor installed with feeders and branch circuit conductors in conduits. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or metal enclosures of service equipment. Ground conduits by means of grounding bushings on terminations at panelboards with installed number 12 conductor to grounding bus.
- L. Grounding electrical system using continuous metal raceway system enclosing circuit conductors in accordance with NEC.
- M. Permanently attach equipment and grounding conductors prior to energizing equipment.

TECHNICAL SPECIFICATIONS

3.05 FIELD QUALITY CONTROL

- A. General Conditions: Field inspecting, testing, adjusting, and balancing.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.
- D. Perform ground resistance testing in accordance with IEEE 142.
- E. Perform leakage current tests in accordance with NFPA 99.
- F. Perform continuity testing in accordance with IEEE 142.
- G. When improper grounding is found on receptacles, check receptacles in entire project and correct. Perform retest.

END OF SECTION 16060

TECHNICAL SPECIFICATIONS

SECTION 16070 HANGERS, SUPPORTS AND FIRESTOPPING FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Conduit supports.
 - 2. Formed steel channel.
 - 3. Spring steel clips.
 - 4. Sleeves.
 - 5. Mechanical sleeve seals.
 - 6. Firestopping relating to electrical work.
 - 7. Firestopping accessories.
 - 8. Equipment bases and supports.

- B. Related Sections:
 - 1. Section 03300 - Cast-In-Place Concrete: Product requirements for concrete for placement by this section.

1.02 REFERENCES

- A. FM Global:
 - 1. FM - Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.

- B. National Fire Protection Association:
 - 2. NFPA 70 - National Electrical Code.

- C. Intertek Testing Services (Warnock Hersey Listed):
 - 1. WH - Certification Listings.

1.03 DEFINITIONS

Not Applicable

1.04 SYSTEM DESCRIPTION

Not Applicable

1.05 PERFORMANCE REQUIREMENTS

Not Applicable

1.06 SUBMITTALS

- A. General Conditions: Requirements for submittals.

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- B. Shop Drawings: Indicate system layout with location and detail of trapeze hangers.
- C. Product Data:
 - 1. Hangers and Supports: Submit manufacturers catalog data including load capacity.
- D. Design Data: Indicate load carrying capacity of trapeze hangers and hangers and supports.
- E. Manufacturer's Installation Instructions:
 - 1. Hangers and Supports: Submit special procedures and assembly of components.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- G. Engineering Judgements: For conditions not covered by UL or WH listed designs, submit judgements by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.

1.07 QUALITY ASSURANCE

Not Applicable

1.08 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three years documented experience approved by manufacturer.

1.09 PRE-INSTALLATION MEETINGS

- A. General Conditions: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. General Conditions: Requirements for transporting, handling, storing, and protecting products.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

TECHNICAL SPECIFICATIONS

1.11 ENVIRONMENTAL REQUIREMENTS

Not Applicable

PART 2 – PRODUCTS

2.01 CONDUIT SUPPORTS

- A. Hanger Rods: Threaded high tensile strength galvanized carbon steel with free running threads.
- B. Beam Clamps: Malleable Iron, with tapered hole in base and back to accept either bolt or hanger rod. Set screw: hardened steel.
- C. Conduit clamps for trapeze hangers: Galvanized steel, notched to fit trapeze with single bolt to tighten.
- D. Conduit clamps - general purpose: One hole malleable iron for surface mounted conduits.
- E. Cable Ties: High strength nylon temperature rated to 185 degrees F (85 degrees C). Self locking.

2.02 FORMED STEEL CHANNEL

- A. Product Description: Galvanized 12 gage (2.8 mm) thick steel. With holes 1-1/2 inches (38 mm) on center.

2.03 SPRING STEEL CLIPS

- A. Product Description: Mounting hole and screw closure.

2.04 SLEEVES

- A. Furnish materials in accordance with City of Carson standards.
- B. Sleeves Through Non-fire Rated Floors: 18 gage (1.2 mm) thick galvanized steel.

2.05 MECHANICAL SLEEVE SEALS

- A. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

TECHNICAL SPECIFICATIONS

PART 3 – EXECUTION

3.01 INSTALLATION - HANGERS AND SUPPORTS

- A. Anchors and Fasteners:
 - 1. Concrete Structural Elements: Provide precast inserts, expansion anchors, and preset inserts.
 - 2. Steel Structural Elements: Provide beam clamps, spring steel clips, steel ramset fasteners, and welded fasteners.
 - 3. Concrete Surfaces: Provide self-drilling anchors and expansion anchors.
 - 4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Provide toggle bolts and hollow wall fasteners.
 - 5. Solid Masonry Walls: Provide expansion anchors and preset inserts.
 - 6. Sheet Metal: Provide sheet metal screws.
 - 7. Wood Elements: Provide wood screws.

- B. Inserts:
 - 1. Install inserts for placement in concrete forms.
 - 2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches (100 mm).
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut flush with top of slab.

- C. Install conduit and raceway support and spacing in accordance with NEC.

- D. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.

- E. Install multiple conduit runs on common hangers.

- F. Supports:
 - 1. Fabricate supports from structural steel or formed steel channel. Install hexagon head bolts to present neat appearance with adequate strength and rigidity. Install spring lock washers under nuts.
 - 2. Install surface mounted cabinets and panelboards with minimum of four anchors.
 - 3. In wet and damp locations install steel channel supports to stand cabinets and panelboards 1 inch (25 mm) off wall.
 - 4. Support vertical conduit at every floor.

- G. Support EMT within twelve inches of each outlet, junction box, cabinet or fitting and every eight-foot there after. Combination box/conduit hangers are not allowed.
 - 1. Acceptable Individual conduit hanger manufacturers
 - a. Appleton
 - b. Minerallac

TECHNICAL SPECIFICATIONS

- c. OZ Mfr. Co.
- d. Erico-Products
- e. Steel City
- f. Thomas & Betts

- H. Support for multiple conduit runs shall consist of trapeze type hangers as required. Galvanized bolts or rods shall be 1/2" minimum diameter and anchored to structure. Provide support system clamp for each conduit on hangers. Support systems shall utilize 1-5/8" x 1-5/8" x 12 gage multi-purpose steel channels, complete with all necessary hardware, clamps, etc. all channel hardware shall be galvanized and/or plated to prevent corrosion. Channel sizes and quantity, and number of support rods shall be increased to support increased weights. Design each assembly to carry the combined weight of conduit and wire, assembly itself plus 100 pounds. Provide space for 25 percent additional conduit of the same size. See Section 16010 for anchor requirements.
- 1. Acceptable Manufacturers of channel support Systems
 - a. B-Line
 - b. Kindorf
 - c. Superstrut
 - d. Unistrut

3.02 INSTALLATION - FIRESTOPPING

- A. Non-Rated Surfaces:
- 1. Seal opening through non-fire rated wall, partition, floor, ceiling and roof opening as follows:
 - a. Install sleeve through opening and extending beyond minimum of 1 inch (25 mm) on both sides of building element.
 - b. Size sleeve allowing minimum of 1 inch (25 mm) void between sleeve and building element.
 - c. Install type of firestopping material recommended by manufacturer.
 - 2. Install floor plates or ceiling plates where conduit, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces include rooms with finished ceilings and where penetration occurs below finished ceiling.
 - 3. Exterior wall openings below grade: Assemble rubber links of mechanical seal to size of conduit and tighten in place, in accordance with manufacturer's instructions.
 - 4. Interior partitions: Seal pipe penetrations at computer rooms and data rooms. Apply sealant to both sides of penetration to completely fill annular space between sleeve and conduit.

3.03 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

- A. Provide housekeeping pads of concrete, minimum 3-1/2 inches (87 mm) thick and extending 4 inches (150 mm) beyond supported equipment. Refer to Section 03300.
- B. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.

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- C. Construct supports of steel members. Brace and fasten with flanges bolted to structure.

3.04 INSTALLATION - SLEEVES

- A. Exterior watertight entries: Seal with adjustable interlocking rubber links.
- B. Conduit penetrations not required to be watertight: Sleeve and fill with silicon foam.
- C. Set sleeves in position in forms. Provide reinforcing around sleeves.
- D. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- E. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.
- F. Where conduit or raceway penetrates floor, ceiling, or wall, close off space between conduit or raceway and adjacent work with fire stopping insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- G. Install chrome plated steel escutcheons at finished surfaces.

3.05 FIELD QUALITY CONTROL

- A. General Conditions: Field inspecting, testing, adjusting, and balancing.
- B. Inspect installed firestopping for compliance with specifications and submitted schedule.

3.06 CLEANING

- A. General Conditions: Requirements for cleaning.
- B. Clean adjacent surfaces of firestopping materials.

3.07 PROTECTION OF FINISHED WORK

- A. General Conditions: Requirements for protecting finished Work.
- B. Protect adjacent surfaces from damage by material installation.

END OF SECTION 16070

TECHNICAL SPECIFICATIONS

SECTION 16073 SEISMIC PROTECTION FOR ELECTRICAL EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

- A. Structural design and calculations for major equipment anchoring, conduit support, and bracing details.

1.02 RELATED SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.03 REFERENCES

- A. International Building Code, 2012
- B. UL 1570 – Fluorescent Lighting Fixtures
- C. UL 1571 – Incandescent Lighting Fixtures
- D. UL 1572 – HID Lighting Fixtures
- E. UL1573 – Stage Lighting Units
- F. UL1574 – Track Lighting Systems

1.04 CODE INFORMATION

- A. This project is subject to the seismic bracing requirements of the International Building Code, 2012 edition. The following criteria are applicable to this project.
 - 1. Seismic Use Group: II
 - 2. Site Class Category: D
 - 3. Seismic Design Category: D
 - 4. See Sheet A01 and S1 Code Analysis for additional information.
- B. It is recommended that the contractor enlist the services of a qualified seismic bracing vendor/supplier. Provide bracing for identified equipment and system.
- C. Resistance to lateral forces induced by earthquakes shall be accomplished with consideration of friction resulting from gravity loads. The following companies

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are listed as resources for the Contractor to consider for obtaining competent assistance regarding the seismic bracing of mechanical piping and equipment. Since seismic constraint is not a common mechanical requirement for projects, and considering that the requirements are specific and include technical expertise, this information may be helpful.

1. Amber Booth
2. Cooper B-Line
3. Mason Industries
4. Tolco (Division of Nibco)

1.05 SUBMITTALS

- A. Shop Drawings: Detail drawings along with catalog cuts, templates, and erection and installation details, as appropriate, for the items listed. Submittals shall be complete in detail; shall indicate thickness, type, grade, class of metal, and dimensions; and shall show construction details, reinforcement, anchorage, and installation with relation to the building construction.
 1. Lighting Fixtures in Buildings.
 2. Equipment Requirements.
- B. Product Data:
 1. Copies of the design calculations with the detail drawings. Calculations shall be stamped by a registered engineer in the State of Nevada and shall verify the capability of structural members to which bracing are attached for carrying the load from the brace. Structural seismic calculations for equipment anchorage for major equipment shall be included.
 2. Contractor Designed Bracing: Copies of the Design Calculations with the Drawings. Calculations shall be approved, certified, stamped and signed by a Registered Professional Engineer. Calculations shall verify the capability of structural members to which bracing are attached for carrying the load from the brace.
- C. Include Seismic Certification for major equipment.
 1. Light Fixtures.
 2. Switchboards.
 3. Panelboards.

TECHNICAL SPECIFICATIONS

1.06 QUALIFICATION

- A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.
- B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.
- C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five years. When requested by the engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- D. Provide Seismic qualified equipment as follows:
The equipment and major components shall be suitable for and certified by actual seismic testing to meet all applicable seismic requirements of the 2012 International Building Code (IBC) Site Classification D. The site coefficients $F_a=1.0$, and spectral response accelerations of $S_s=2.332g$, $S_1=0.811g$ are used. The test response spectrum shall be based upon a 5% damping factor, and a peak (S_d s) of at least 1.555g's (3-12 Hz) applied at the base of the equipment in the horizontal direction. The forces in the vertical direction shall be at least 66% if those in the horizontal direction. The tests shall cover a frequency range from 1 to 100Hz. Guidelines for the installation consistent with these requirements shall be provided by the equipment manufacturer and based upon testing of representative equipment. Equipment certification acceptance criteria shall be based upon the ability for the equipment to be returned to service immediately after a seismic event within the above requirements without the need for repairs.

1.07 SYSTEM DESCRIPTION

- A. The requirements for seismic protection measures described in this section shall be applied to the electrical equipment and systems listed below.
- B. Electrical Equipment: Electrical equipment shall include the following items to the extent required on the Drawings or in other sections of these specifications:
 - 1. Light Fixtures.
 - 2. Switchboards
 - 3. Panelboards.
- C. Electrical Systems: The following electrical systems shall be seismically protected in accordance with this specification: Lighting, power, security, communications and fire alarm.
- D. Conduits Requiring No Special Seismic Restraints: Seismic restraints may be omitted from electrical conduit less than 2-1/2 inches trade size. All other interior conduit, shall be seismically protected as specified.

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1.08 EQUIPMENT REQUIREMENTS

- A. Rigidly Mounted Equipment: Constructed and assembled to withstand the seismic forces in accordance with IBC 2012. Each item of rigid electrical equipment shall be entirely located and rigidly attached on one side only of a building expansion joint. Piping, electrical conduit, etc., which cross the expansion joint shall be provided with flexible joints that are capable of accommodating displacements equal to the full width of the joint in both orthogonal directions.

PART 2 – PRODUCTS

2.01 LIGHTING FIXTURE SUPPORTS

- A. Lighting fixtures and supports shall conform to UL 1570, UL 1571, UL1572, UL1573 or UL1574 as applicable.

PART 3 – EXECUTION

3.01 SWAY BRACES FOR CONDUIT

- A. Sway bracing materials shall consist of rods, plates, angles, etc.

3.02 LIGHTING FIXTURES IN BUILDINGS

- A. Pendant Fixtures: Per manufacturer's mounting requirements and details on plans. Provide sway bracing for all pendant fixtures that will hit something if they sway less than 45 degrees.
 - 1. Pendant fixtures must be able to sway 45 degrees from vertical without hitting ductwork, piping, walls, soffits, etc. Where this is not possible provide sway bracing per detail on plans.
- B. Ceiling Attached Fixtures:
 - 1. Recessed Fluorescent Fixtures: Recessed fluorescent individual or continuous-row mounted fixtures shall be supported by a seismic-resistant suspended ceiling support system built in accordance with the ASTM E 580. Recessed lighting fixtures not over 56 pounds in weight may be supported by and attached directly to the ceiling seismic design. Fixture accessories, including louvers, diffusers, and lenses shall have lock or screw attachments.
 - 2. Surface-Mounted Fluorescent Fixtures: Surface-mounted fluorescent individual or continuous-row fixtures shall be attached to a seismic-restraint ceiling support system built in accordance with ASTM E 580.

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- C. Assembly Mounted on Outlet Box: A supporting assembly, that is intended to be mounted on an outlet box, shall be designed to accommodate mounting features on 4-inch boxes, plaster rings, and fixture studs.
- D. Wall-Mounted Emergency Light Unit: Attachments for wall-mounted emergency light units shall be designed and secured for the worst expected seismic disturbance at the site.

3.03 ANCHOR BOLTS

- A. Cast-In-Place: Floor or pad mounted equipment shall use cast-in-place anchor bolts or Hilti HDA anchors as indicated. One nut shall be provided on each bolt. Anchor bolts shall conform to ASTM F 1554, Grade 36. Anchor bolts shall have an embedded straight length equal to at least 12 times nominal diameter of the bolt. Anchor bolts that exceed the normal depth of equipment foundation piers or pads shall either extend into concrete floor or the foundation shall be increased in depth to accommodate bolt lengths.
- B. Expansion or Chemically Bonded Anchors: Expansion or chemically bonded anchors shall not be used unless test data in accordance with ASTM E 488 has been provided verify the adequacy of the specific anchor and application. Expansion of chemically bonded anchors shall not be used to resist pull-out in overhead and wall installations.

3.04 RESILIENT VIBRATION ISOLATION DEVICES

- A. Where the need for these devices is determined, based on the magnitude of the design seismic forces, selection of anchor bolts for vibration isolation devices and/or snubbers for equipment base and foundations shall follow the same procedure as in paragraph ANCHOR BOLTS, except that an equipment weight equal to three times the actual equipment weight shall be used.

3.05 SWAY BRACES FOR CONDUIT 2-1/2" TRADESIZE AND GREATER

- A. Sway braces shall be provided to prevent movement of the conduits under seismic loading. Braces shall be provided in both the longitudinal and transverse directions, relative to the axis of the pipe. The bracing shall not interfere with thermal expansion requirements for the pipes as described in other sections of these specifications.
- B. Transverse Sway Bracing: Install transverse sway bracing for steel and conduit. All runs (length of pipe between end joints) shall have a minimum of two transverse braces.
- C. Longitudinal Sway Bracing: Longitudinal sway bracing shall be provided at 40 foot intervals unless otherwise indicated. A;; runs (length of conduit between end

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joints) shall have one longitudinal brace minimum. Branch lines, walls, or floors shall not be used as sway braces.

- D. Vertical Runs: Run is defined as length of pipe between end joints. Vertical runs of conduit shall be braced at not more than 10-foot vertical intervals. Braces for vertical runs shall be above the center of gravity of the segment being braced. Sway braces shall not be used as sway braces.
- E. Clamps and Hangers: Clamps or hangers in conduits shall be applied directly to conduit.
- F. Anchor Rods, Angles, and Bars: Anchor rods, angles, and bars shall be bolted to either pipe clamps or pipe flanges at one end and cast-in-place concrete or masonry insert or clip angles bolted to the steel structure in the other end. Rods shall be solid metal or pipe as specified below. Anchor rods, angles, and bars shall not exceed lengths given in the tabulation below.

3.06 EQUIPMENT SWAY BRACING

- A. Suspended Equipment: Equipment sway bracing shall be provided for items supported from overhead structural systems. Braces shall consist of angles, rods, bars, or pipes and secured at both ends with not less than ½-inch bolts. Sufficient braces shall be provided for equipment to resist a horizontal force equal to three times the weight of equipment without exceeding safe working stress of bracing components. Details of equipment bracing shall be submitted for acceptance. In lieu of bracing with vertical supports, these items may be supported and braced with hangers inclined at 45 degrees directed up and radially away from equipment and oriented symmetrically in 90-degree intervals on the horizontal plane, bisecting the angles of each corner of the equipment, provided that supporting members are properly sized to support operating weight of equipment when hangers are inclined at a 45-degree angle.
- B. Floor or Pad Mounted Equipment:
 - 1. Shear Resistance: Floor mounted equipment shall be bolted to the floor. Requirements for the number and installation of bolts to resist shear forces shall be in accordance with paragraph ANCHOR BOLTS.
 - 2. Overturning Resistance: The ratio of the overturning moment from seismic forces to the resisting moment due to gravity loads shall be used to determine if overturning forces need to be considered in the sizing of anchor bolts. Calculations shall be provided to verify the adequacy of the anchor bolts for combined shear and overturning.

END OF SECTION 16073

TECHNICAL SPECIFICATIONS

SECTION 16095 MINOR ELECTRICAL DEMOLITION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Removal of existing electrical equipment, wiring, and conduit in areas to be remodeled; removal of designated construction; dismantling, cutting and alterations for completion of the Work.
 - 2. Disposal of materials.
 - 3. Storage of removed materials.
 - 4. Identification of utilities.
 - 5. Salvaged items.
 - 6. Protection of items to remain as indicated on Drawings.
 - 7. Relocate existing equipment to accommodate construction.
- B. Related Sections:
 - 1. Section 08305 - Access Doors and Panels: Execution requirements for access doors and panels specified by this section.

1.02 SUBMITTALS

- A. General Conditions: Requirements for submittals.
- B. Shop Drawings: Indicate demolition and removal sequence and location of salvageable items; location and construction of temporary work. Describe demolition removal procedures and schedule.

1.03 CLOSEOUT SUBMITTALS

- A. General Conditions: Requirements for submittals.
- B. Project Record Documents: Record actual locations of capped utilities, conduits and equipment abandoned in place.

1.04 QUALITY ASSURANCE

- A. Perform Work in accordance with Municipality of City of Carson Public Work's standard.

1.05 PRE-INSTALLATION MEETINGS

- A. General Conditions: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.06 SEQUENCING

- A. General Conditions: Requirements for sequencing.

TECHNICAL SPECIFICATIONS

- B. Sequence as requested for project.

1.07 SCHEDULING

- A. General Conditions: Requirements for scheduling.
- B. Schedule work to coincide with new construction or remodeled/ renovation area.
- C. Cease operations immediately when structure appears to be in danger and notify Architect/Engineer. Do not resume operations until directed.

1.08 COORDINATION

- A. General Conditions: Requirements for coordination.
- B. Conduct demolition to minimize interference with adjacent [and occupied] building areas.
- C. Coordinate demolition work with General Contractor.
- D. Coordinate and sequence demolition so as not to cause shutdown of operation of surrounding areas.
- E. Shut-down Periods:
 - 1. Arrange timing of shut-down periods of in service panels with Owner. Do not shut down any utility without prior written approval.
 - 2. Keep shut-down period to minimum or use intermittent period as directed by Owner.
 - 3. Maintain life-safety systems in full operation in occupied facilities, or provide notice minimum 3 days in advance.
- F. Identify salvage items in cooperation with Owner.

1.09 CONTRACTOR'S USE OF PREMISES

- A. Confine operations at site to areas and limits permitted by law, ordinances, permits; contract documents and general conditions.
- B. Protection and safekeeping of products stored on premises is responsibility of contractor supplying product.
- C. Deliveries and unloading shall be scheduled to prevent traffic congestion blocking of access or interference with work. Arrange deliveries to avoid larger accumulations of materials than can be suitably stored at site.
- D. Contractor shall pay for, or satisfactorily repair, all damages incident to their work, to sidewalks, streets, other public or private property, or to any public utilities occurring during period of work under this contract.

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PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 EXAMINATION

- A. General Conditions: Verification of existing conditions before starting work.
- B. Visit site and survey existing conditions affecting work prior to bid. Include necessary materials and labor to accomplish the electrical work, including relocation of existing services and utilities on building site in bid. No consideration shall be given to future claims due to existing conditions. Any discrepancies or interference shall be reported immediately to the consultant.
- C. Verify wiring and equipment indicated to be demolished serve only abandoned facilities.
- D. Verify termination points for demolished services.

3.02 PREPARATION

- A. Erect, and maintain temporary safeguards, including warning signs and lights, barricades, and similar measures, for protection of the public, Owner, Contractor's employees, and existing improvements to remain.
- B. Temporary egress signage and emergency lighting

3.03 DEMOLITION

- A. Demolition Drawings are based on casual field observation and existing record documents. Report discrepancies to Architect/Engineer before disturbing existing installation. Demolish existing electrical work, including auxiliary systems, in areas of existing building shown reworked. Coordinate removal of electrical systems with General Contractor and Owner.
- B. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- C. Remove conduit, wire, boxes, and fastening devices to avoid any interference with new installation.
- D. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.
- E. Reconnect equipment being disturbed by renovation work and required for continue service to nearest available panel.
- F. Disconnect or shut off service to areas where electrical work is to be removed. Remove electrical fixtures, equipment, and related switches, outlets, conduit and wiring which are not part of final project.

TECHNICAL SPECIFICATIONS

- G. Install temporary wiring and connections to maintain existing systems in service during construction.
- H. Perform work on energized equipment or circuits with experienced and trained personnel.
- I. Remove, relocate, and extend existing installations to accommodate new construction.
- J. Repair adjacent construction and finishes damaged during demolition and extension work.
- K. Remove exposed abandoned grounding and bonding components, fasteners and supports, and electrical identification components, including abandoned components above accessible ceiling finishes. Cut embedded support elements flush with walls and floors.
- L. Clean and repair existing equipment to remain or to be reinstalled.
- M. Protect and retain power to existing active equipment remaining.
- N. Cap abandoned empty conduit at both ends.
- O. In reworked areas, remove all electrical equipment; i.e.: Light fixtures, panelboards, switches, receptacles, auxiliary system devices, telephone outlets, etc.; unless otherwise noted. Remove existing branch circuits (conduit, wire, outlet boxes and supports) serving equipment to be removed. Abandon circuits concealed in concrete. Remove conductors from abandoned conduits. Leave existing branch circuits and feeders which run through reworked areas and serve existing equipment to remain in service, continuous and uninterrupted. Repair, re-terminate, re-support, etc., any damaged circuits, feeders or supports.
- P. Abandon outlets in existing masonry and brick walls: provide blank stainless steel cover plates.
- Q. Cut off abandoned conduits concealed in slab one inch below top of base floor slab and patch slab or floor to match existing.

3.04 EXISTING PANELBOARDS

- A. Ring out circuits in existing panel affected by the Work. Where additional circuits are needed, reuse circuits available for reuse. Install new breakers.
- B. Tag unused circuits as spare.
- C. Where existing circuits are indicated to be reused, use sensing measuring devices to verify circuits feeding Project area or are not in use.
- D. Remove existing wire no longer in use from panel to equipment.
- E. Provide new updated directories where more than three circuits have been modified or rewired.

TECHNICAL SPECIFICATIONS

3.05 SALVAGE ITEMS

- A. Electrical equipment, wiring, etc., removed and not required to be part of new electrical installation is classed as salvage.
- B. The Contractor shall submit a list of salvageable equipment and/or parts identified below that are to be removed. Provide list to Owner for review.
- C. The list shall contain the following:
 - 1. type of equipment
 - 2. quantity
 - 3. manufacturer
 - 4. model #
 - 5. condition (with explanation if needed)
- D. Once the list has been reviewed the Contractor will be notified of any equipment deemed reusable by the Owner.
- E. Salvageable equipment not selected to be retained by the Owner becomes property of Contractor. Remove from job site.

3.06 REUSABLE ELECTRICAL EQUIPMENT

- A. Carefully remove equipment, materials, or fixtures which are to be reused.
- B. Disconnect, remove, or relocate existing electrical material and equipment interfering with new installation.
- C. Relocate existing lighting fixtures as indicated on Drawings. Clean fixtures and re-lamp. Test fixture to see if it is in good working condition before installation at new location.

3.07 CUTTING AND REPAIRING

- A. Cut and repair walls floors, roof, etc., as required for installation of work in this Division. Employ professional installers of repair materials where repair work is major or aesthetics are of primary importance.
- B. Do not pierce exterior walls below grade with hanger bolts. Do not cut building structural members except where accepted by Engineer. Do not use core drilling as a cutting method above telephone, electrical or data equipment. Use hammer drill only (size limited). Contain water below floor at any location of core drilling. Locate final holes to avoid cutting existing rebar as much as possible.
- C. Repair work shall be comparable with work cut. New finishes shall match adjacent finishes. Engineer will review repaired work and may reject unsuitable work.

3.08 HAZARDOUS MATERIALS

- A. Submit Material Safety Data Sheets for all materials furnished in this project defined as hazardous by NFPA. All requirements of the Material Safety Data Sheets shall be

TECHNICAL SPECIFICATIONS

implemented and followed judiciously when hazardous materials are installed or otherwise used.

- B. All hazardous materials shall be stored and used (mixed, applied, etc.) in strict accordance with the OSHA Standards, and Safety Data Sheets.

3.09 WELDING AND CUTTING

- A. Special precautions shall be taken to reduce fire hazards where electric or gas welding or cutting work or soldering is done and suitable fire extinguishing equipment shall be maintained near such operations.

3.10 CLEANING

- A. General Conditions: Requirements for cleaning.
- B. Remove demolished materials as work progresses. Legally dispose.
- C. Keep workplace neat.

3.11 PROTECTION OF FINISHED WORK

- A. General Conditions: Requirements for protecting finished Work.
- B. Do not permit: traffic over unprotected floor surface.

3.12 DISPOSAL PROCEDURES (FLUORESCENT BULBS, BALLASTS & LIGHT FIXTURES)

- A. These materials do not require special training to remove or package.
- B. The Contractor shall contract with Waste Management LampTracker to recycle the lamps (fluorescent bulbs) and ballasts removed during the project. The costs to recycle these materials is the responsibility of the contractor. The disposal and costs of non-regulated materials (light fixtures) is the responsibility of the Contractor. The Contractor is required to recycle as much material as possible.

C. LAMPS

1. The lamps contain mercury and are required to be properly recycled. If the lamps were crushed they would no longer be classified as regulated waste but would be hazardous waste which is not permitted.
2. The removed lamps are to be placed into boxes obtained from LampTracker for recycling. The box is to be closed with clear packing tape. The box is required to also meet the following additional requirements.
 - a. Each box is to be properly closed with clear tape.
 - b. The boxes are to be placed on a pallet and shrink-wrapped.
 - c. 4 foot lamps boxes are not to be stacked higher than 66 inches.
 - d. 8 foot lamps boxes are not to be stacked higher than 48 inches.
 - e. Each box is to be properly labeled per the labeling section in this document.
3. The Contractor is required to protect the boxes from the weather. If the boxes

TECHNICAL SPECIFICATIONS

become wet for any reason, the Contractor is required to replace the boxes at no cost to OWNER.

4. The recycling facility will not take boxes that have indications that they may have leaked materials. Water stained boxes cannot be accepted.
5. The Contractor is required to use proper packing and arrange for picking by Waste Management.

D. BROKEN LAMPS

1. The Contractor is to minimize lamp breakage. However, if breakage does occur and the majority (75%) of the bulb is still intact, place this portion in the lamp boxes for recycling. The smaller pieces are to be swept up and placed into a sealable 5 gallon bucket. The pieces are not to be vacuumed.
2. Broken lamp buckets are required to be labeled per the Labeling Section in this document.

E. BALLAST RECYCLING

1. The Contractor is to separate the ballasts into two types: ballasts with the "NO PCBs" label, and ballast that do not contain the label. Contractor shall order the appropriate size containers depending on the quantity of ballasts. The Contractor properly package and arrange for pickup by Waste Management. The containers are required to be properly labeled, placed on pallets, shrink wrapped and cannot exceed 700 pounds.

F. LABELING

1. The Contractor is required to place a label on all containers/boxes. The label must be accurate and visible once placed on the pallet for shipping. The labels can be pre-printed by the Contractor with the date and number of units in each container marked in the field. If the number of units is not correct and the recycling facility determines that the shipment is not acceptable and returns delivery, the Contractor is responsible for all charges to correct.
2. The following are the requirements for all labels.
 - a. Lamps
Universal Waste/Used Mercury Lamps for Recycling
Date: _____ Number of Units: _____
Location: Building Name: Street Address, City and State
 - b. Broken Lamps
Broken Universal Waste/Used Mercury Lamps for Recycling
Date: _____ Number of Units: _____
Location: Building Name: Street Address, City and State
 - c. Non-PCB Ballast
Non-PCB Ballast for Recycling
Date: _____ Number of Units: _____
Location: Building Name: Street Address, City and State
 - d. PCB Ballast
PCB Ballast for Recycling
Date: _____ Number of Units: _____
Location: Building Name: Street Address, City and State

TECHNICAL SPECIFICATIONS

END OF SECTION 16095

TECHNICAL SPECIFICATIONS

SECTION 16123 BUILDING WIRE AND CABLE

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes building wire and cable and wiring connectors and connections.
- B. Related Sections:
 - 1. Section 16040 - Identification for Electrical Systems: Product requirements for wire identification.

1.02 REFERENCES

- A. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- B. National Fire Protection Association:
 - 1. NFPA 70 - National Electrical Code.
 - 2. NFPA 262 - Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.
- C. Underwriters Laboratories, Inc.:
 - 1. UL 1277 - Standard for Safety for Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.

1.03 SYSTEM DESCRIPTION

- A. Product Requirements: Provide products as follows:
 - 1. Solid conductor for feeders and branch circuits 10 AWG and smaller.
 - 2. Stranded conductors for feeders and branch circuits 8 AWG and larger.
 - 3. Stranded conductors for control circuits.
 - 4. Conductor not smaller than 12 AWG for power and lighting circuits.
 - 5. Conductor not smaller than 16 AWG for control circuits.
 - 6. Increase wire size in branch circuits to limit voltage drop to a maximum of 3 percent.
- B. Wiring Methods: Provide the following wiring methods:
 - 1. All Locations Unless Noted Otherwise: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway.

1.04 DESIGN REQUIREMENTS

- A. Conductor sizes are based on copper unless indicated as aluminum or "AL".

1.05 SUBMITTALS

- A. General Conditions: Requirements for submittals.

TECHNICAL SPECIFICATIONS

- B. Product Data: Submit for building wire.
- C. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors.
- D. Test Reports: Indicate procedures and values obtained.

1.06 CLOSEOUT SUBMITTALS

- A. General Conditions: Requirements for submittals.
- B. Project Record Documents: Record actual locations of components and circuits.

1.07 QUALITY ASSURANCE

- A. Provide wiring materials located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet (1.5 m) when tested in accordance with NFPA 262.
- B. Maintain one copy of each document on site.

1.08 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.09 FIELD MEASUREMENTS

- A. Verify field measurements are as indicated on Drawings.

1.10 COORDINATION

- A. General Conditions: Requirements for coordination.
- B. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.
- C. Wire and cable routing indicated is approximate unless dimensioned.

PART 2 PRODUCTS

2.01 BUILDING WIRE

- A. Product Description: Single conductor insulated wire.
- B. Conductor: Copper.
- C. Insulation Voltage Rating: 600 volts.
- D. Insulation Temperature Rating: 90 degrees C.

TECHNICAL SPECIFICATIONS

E. Insulation Material: Thermoplastic.

2.02 ARMORED CABLE

A. Type AC Cable may not be used on this project.

2.03 METAL CLAD CABLE

A. Type MC Cable may not be used on this project and is strictly prohibited.

2.04 CONNECTORS AND SPLICES

- A. Provide UL-listed factory-fabricated wiring connectors of size, ampacity rating, material, type and class for application and for service indicated. Select connectors to comply with Project's installation requirements and as specified in Part 3 "Applications" of this Article.
- B. For Conductors #10 AWG and Smaller: Wire and cable connectors shall be solderless, twist on, 600 volts, 105°C., shall comply with UL 486A/C standards. Connectors coded for easy selection compatible with wiring to be spliced. Install connectors as recommended by manufacturer. Use proper crimping tool where crimp sleeves are used.
1. Acceptable Connector Manufacturers
 - a) 3M- "Scotchlock"
 - b) Buchanan - "B Cap"
 - c) Thomas & Betts - "Stak-On"
 - d) Ideal - "Wing Nuts"
- C. Compression Splices: Splice conductors #8 and larger with solid copper barrel, type fittings applied with an appropriate hydraulic tool. Splices used only where approved. Splice fittings: Burndy "Hydent". Insulate splices with 600 volt, 105°C, "heat shrink", "cold shrink" covers, or taped insulation consisting of rubber, friction and vinyl tapes applied per manufacturer for 600 volt, 105°C covering to 150 percent of installation rating of conductor.
1. Acceptable Splice and Tape Manufacturers
 - a) Burndy
 - b) Thomas & Betts
 - c) IIsco
 - d) Anderson
 - e) Blackburn
 - f) Oz/Gedney
- D. Connectors and/or Terminations for Conductors #6 AWG and larger: Tin plated, 98% copper, dual crimp long barrel compression lugs with two bolt holes, insulated with molded covers to accommodate 1/2" bolts. Apply with hydraulic tool recommended by manufacturer.
1. Acceptable Manufacturers and Products
 - a) O-Z Gedney
 - b) Burndy Engineering Company "Hylugs"
 - c) Thomas and Betts, "Color Keyed"
 - d) Anderson

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- E. Use pulling lubricant which will not be detrimental to insulation of conductors indicated by published user information.
 - 1. Acceptable Manufacturers of Lubricant
 - a) Ideal Industries
 - b) Panduit Corp.
 - c) OZ/Gedney
 - d) Plymouth/Bishop
 - e) American Polywater Corp.
 - f) Thomas & Betts

- F. Insulate all live joints to 600 volts with strip rubber, friction tape, and electrical vinyl tape installed in accordance with manufacturers recommendations.
 - 1. Acceptable Tape Manufacturers
 - a) 3M
 - b) Plymouth

PART 3 EXECUTION

3.01 EXAMINATION

- A. General Conditions: Coordination and project conditions.
- B. Verify interior of building has been protected from weather.
- C. Verify mechanical work likely to damage wire and cable has been completed.
- D. Verify raceway installation is complete and supported.

3.02 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.03 EXISTING WORK

- A. Remove exposed abandoned wire and cable , including abandoned wire and cable above accessible ceiling finishes. Patch surfaces where removed cables pass through building finishes.
- B. Disconnect abandoned circuits and remove circuit wire and cable. Remove abandoned boxes when wire and cable servicing boxes is abandoned and removed. Install black cover for abandoned boxes not removed.
- C. Provide access to existing wiring connections remaining active and requiring access. Modify installation or install access panel.
- D. Extend existing circuits using materials and methods compatible with existing electrical installations, or as specified.

TECHNICAL SPECIFICATIONS

- E. Clean and repair existing wire and cable remaining or wire and cable to be reinstalled.

3.04 INSTALLATION

- A. Route wire and cable to meet Project conditions.
- B. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- C. Identify and color code wire and cable under provisions of Section 16040. Identify each conductor with its circuit number or other designation indicated.
- D. Install wiring complete with connections to equipment.
- E. Install wiring so conductors are not in tension in completed system.
- F. Form wiring neatly and group in circuit. Tie grouped conductors with nylon ties, T&B "Tyrap" or approved equivalent.
- G. Each conduit run shall be run complete end to end before conductors are installed.
- H. Use pulling lubricant to decrease pulling tension for all feeder cables, and all difficult cable pulls of any type or size. Pull all conductors into raceway at the same time.
- I. Provide cable supports, at locations required by NEC and/or as shown. Supports with malleable screwed conduit fitting and non-conductive wedges drilled for the size conductors installed. Provide supports rated for all types of insulation and all voltage. Cable supports shall be O.Z./Gedney type "R" or accepted equivalent. Furnish pullbox, sized per NEC for each cable support.
- J. Bond circuit ground wires where installed to all devices, equipment, outlet and junction boxes, and grounding bushings (where provided) with a full size conductor and lugged type connection.
- K. Securely fasten non-ferrous identifying tapes, pressure sensitive labels or engraved nameplates to all cables, feeders and power cables exposed in vaults, inside pull boxes, exposed in manholes, exposed in switchboard, termination compartments, etc. See Section 16040 for nameplates and labels.
- L. Join and terminate copper conductors individually. Do not mix voltages in the same raceway.
- M. Provide lugs where not furnished as part of equipment - furnish as specified above, to connect all conductors.
- N. Furnish lugs for conductors #1/0 and larger with two bolt tongue or accepted equivalent single bolt tongue with anti-turn devices.
- O. Mark all branch circuit conductors at panel terminations including neutrals with pressure sensitive numbers to correspond to circuit numbers connected. See Section 16040 for labels.

TECHNICAL SPECIFICATIONS

- P. Connect circuits and feeders as shown on drawings. Drawings are diagrammatic and do not show every detail required in the wiring system. Detail wiring accomplished per NEC.
- Q. All conductors making up parallel feeders to be same size, same type, and same insulation, all cut same length. Bond each group of conductors making up a phase or neutral at both ends in an approved manner. Parallel conductors shall not be run in the same raceway.
- R. DO NOT COMBINE CIRCUITS into more than three circuits per homerun unless specifically approved by the Consultant.
- S. Neutral conductors shall not be used for equipment grounding.
- T. Provide a separate neutral and grounding conductor for all GFI circuits or GFI devices to ensure an adequate ground-fault return path.
- U. Use #10 AWG for all 20 amp, 120 volt homerun circuits that exceed 75 feet from center of load and 150 feet for 277 volt circuits.
- V. Panelboards may not be used as raceways.
- W. Install crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under screws.
- X. Install terminal lugs on ends of 600 volt wires unless lugs are furnished on connected device, such as circuit breakers.
- Y. Size lugs in accordance with manufacturer's recommendations terminating wire sizes. Install 2-hole type lugs to connect wires 4 AWG and larger to copper bus bars.
- Z. For terminal lugs fastened together such as on motors, transformers, and other apparatus, or when space between studs is small enough that lugs can turn and touch each other, insulate for dielectric strength of 2-1/2 times normal potential of circuit.
- AA. Clean conductor surfaces before installing lugs and connectors.
- BB. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

3.05 WIRE COLOR

- A. General:
 - 1. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following:
 - a. Black and red for single phase circuits at 120/240 volts.
 - b. Black, red, and blue for circuits at 120/240 volts single or three phase.
 - 2. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:
 - a. Black and red for single phase circuits at 120/240 volts.

TECHNICAL SPECIFICATIONS

- b. Black, red, and blue for circuits at 120/240 volts single or three phase.
- B. Neutral Conductors: White. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.
- C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.
- D. Feeder Circuit Conductors: Uniquely color code each phase.
- E. Ground Conductors:
 - 1. For 6 AWG and smaller: Green.
 - 2. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

3.06 FIELD QUALITY CONTROL

- A. General Conditions: Field inspecting, testing, adjusting, and balancing.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

END OF SECTION 16123

TECHNICAL SPECIFICATIONS

SECTION 16128 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes conduit and tubing, surface raceways, wireways, outlet boxes, pull and junction boxes, and handholes.
- B. Related Sections:
 - 1. Section 16040 - Identification for Electrical Systems.
 - 2. Section 16060 - Grounding and Bonding for Electrical Systems.
 - 3. Section 16070 - Hangers and Supports for Electrical Systems.
 - 4. Section 16128 – Raceway and Boxes for Electrical System.
 - 5. Section 16131 - Cabinets and Enclosures.
 - 6. Section 16140 - Wiring Devices.
 - 7. Section 16150 - Wiring Connections.

1.02 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
 - 2. ANSI C80.3 - Specification for Electrical Metallic Tubing, Zinc Coated.
- National Electrical Manufacturers Association:
 - 1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 2. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
 - 3. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
 - 4. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.
 - 5. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
 - 6. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
 - 7. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

1.03 SYSTEM DESCRIPTION

- A. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.
- B. Underground: Provide schedule 40 PVC. Provide pre-cast concrete or nonmetallic handholes, vaults or manholes.
- C. Under Slab on Grade within the Building Perimeter: Provide schedule 40 PVC. Refer to Section 16141.

TECHNICAL SPECIFICATIONS

- D. Outdoor Locations, Above Grade: Provide electrical metallic tubing. Where exposed to physical damage and heavy moisture (including roof tops) use rigid steel conduit. Provide cast metal or nonmetallic outlet, pull, and junction boxes.
- E. In Slab on grade or elevated slabs: Not Permitted.
- F. Interior Wet Locations: Provide rigid steel conduit. Provide cast metal outlet, junction, and pull boxes. Provide flush mounting outlet box in finished areas.
- G. Concealed Dry Locations: Provide electrical metallic tubing. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.
- H. Exposed Dry Locations: Provide electrical metallic tubing, except where exposed to physical damage; provide rigid steel conduit. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.

1.04 DESIGN REQUIREMENTS

- A. Minimum Raceway Size: 1/2inch (13mm) unless otherwise specified. Comply with NEC for minimum size conduit and installation requirements. Minimum size 1/2 inch diameter for branch circuits, minimum size 3/4 inch diameter for homeruns. Minimum size for PVC conduit shall be 3/4 inch in diameter. Conduits shall be installed complete end-to-end prior to installing conductors.

1.05 SUBMITTALS

- A. General Conditions: Submittal procedures.
- B. Product Data: Submit for the following:
 - 1. Flexible metal conduit.
 - 2. Liquidtight flexible metal conduit.
 - 3. Nonmetallic conduit.
 - 4. Flexible nonmetallic conduit.
 - 5. Nonmetallic tubing.
 - 6. Raceway fittings.
 - 7. Conduit bodies.
 - 8. Surface raceway.
 - 9. Wireway.
 - 10. Pull and junction boxes.
 - 11. Handholes.
- C. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.06 CLOSEOUT SUBMITTALS

- A. General Conditions: Closeout procedures.

TECHNICAL SPECIFICATIONS

- B. Project Record Documents:
 - 1. Record actual routing of conduits 2" and larger.
 - 2. Record actual locations and mounting heights of outlet, pull, and junction boxes.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. General Conditions: Product storage and handling requirements.
- B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- C. Protect PVC conduit from sunlight.

1.08 COORDINATION

- A. General Conditions: Coordination and project conditions.
- B. Coordinate installation of outlet boxes for equipment connected under Section 16150.
- C. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

PART 2 PRODUCTS

2.01 METAL CONDUIT

- A. Rigid Steel Conduit: ANSI C80.1.
- B. Intermediate Metal Conduit (IMC): Rigid steel.
- C. Fittings and Conduit Bodies: NEMA FB 1; all steel fittings. Threadless fittings shall not be used.
- D. Terminate rigid conduit in dry locations with two steel locknuts, one inside, one outside of the cabinet, junction box or outlet box and an insulated bushing. Bushings shall be malleable iron or steel with smooth insulating ring molded into edge of bushing to prevent damage to cable. Insulated bushings shall be 150 degree C self extinguishing thermoplastic. Provide grounding bushings on 1 ½ inch conduit and larger. Construction of bushings shall be similar to steel bushings described above except provide lugs for grounding connection.
- E. Where conduits are installed underground, the threaded joints shall be sealed with a conductive joint sealing compound.

2.02 PVC COATED METAL CONDUIT

- A. Product Description: NEMA RN 1; rigid steel conduit with external PVC coating, 40 mil (0.05 mm) thick.
- B. Fittings and Conduit Bodies: NEMA FB 1; steel fittings with external PVC coating to match conduit.

TECHNICAL SPECIFICATIONS

2.03 FLEXIBLE METAL CONDUIT

- A. Product Description: Interlocked steel construction.
- B. Fittings: NEMA FB 1.
- C. Connectors and fittings galvanized steel, threadless type with insulated throats, U.L. approved for grounding means.

2.04 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. Product Description: Interlocked steel construction with PVC jacket.
- B. Fittings: NEMA FB 1.
- C. Fitting Assembly – Sealing type, with steel gland, nylon ring and ground cone inside locknut. All fittings with insulated throat, U.L. approved for grounding means.

2.05 ELECTRICAL METALLIC TUBING (EMT)

- A. Product Description: ANSI C80.3; galvanized tubing.
- B. Fittings and Conduit Bodies: NEMA FB 1; use insulated throat galvanized steel, rain tight, compression or set screw type. Compression type must be used in all medical facilities and in damp locations. Provide grounding bushing on 1¼ inch and larger. **Zinc alloy and similar soft metal castings are not allowed.**

2.06 NONMETALLIC CONDUIT

- A. Product Description: NEMA TC 2; Schedule 40 PVC. Minimum sizes shall be 3/4 inch by diameter.
- B. Fittings and Conduit Bodies: NEMA TC 3.
- C. Fittings same material as conduit and installed with watertight joint compound recommended by manufacturer.

2.07 WIREWAY

- A. Product Description: NEMA Type 1, General purpose, Oiltight and dust-tight. NEMA Type 3R, raintight type wireway as required to meet project conditions. Open to assembly.
- B. Knockouts: NEMA Type 1, Manufacturer's standard. NEMA Type 3R, none.
- C. Size: As indicated on Drawings.
- D. Cover: NEMA Type 1 – Removable hinged cover latches with captive screws. NEMA Type 3R – Removable cover with quick-release latches and full gaskets.
- E. Connector: Slip-in.

TECHNICAL SPECIFICATIONS

- F. Fittings: Lay-in type with removable top, bottom, and side; captive screws.
- G. Finish: Rust inhibiting primer coating with gray enamel finish.

2.08 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
 - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2 inch (13 mm) male fixture studs where required.
 - 2. Concrete Ceiling Boxes: Concrete type.
- B. Nonmetallic Outlet Boxes: NEMA OS 2.
- C. Cast Boxes: NEMA FB 1, Type FD, cast ferrous alloy. Furnish gasketed cover by box manufacturer.
- D. Wall Plates for Finished Areas: As specified in Section 16140.
- E. Wall Plates for Unfinished Areas: Furnish gasketed cover.

2.09 PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.
- B. Hinged Enclosures: As specified in Section 16131.

PART 3 EXECUTION

3.01 EXAMINATION

- A. General Conditions: Coordination and project conditions.
- B. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

3.02 EXISTING WORK

- A. Remove exposed abandoned raceway, including abandoned raceway above accessible ceiling finishes. Cut raceway flush with walls and floors, and patch surfaces.
- B. Remove concealed abandoned raceway to its source.
- C. Disconnect abandoned outlets and remove devices. Remove abandoned outlets when raceway is abandoned and removed. Install blank cover for abandoned outlets not removed.
- D. Maintain access to existing boxes and other installations remaining active and requiring access. Modify installation or provide access panel.

TECHNICAL SPECIFICATIONS

- E. Extend existing raceway and box installations using materials and methods compatible with existing electrical installations, or as specified.
- F. Clean and repair existing raceway and boxes to remain or to be reinstalled.

3.03 INSTALLATION

- A. Ground and bond raceway and boxes in accordance with Section 16060.
- B. Fasten raceway and box supports to structure and finishes in accordance with Section 16070.
- C. Identify raceway and boxes in accordance with Section 16075.
- D. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.04 INSTALLATION - RACEWAY

- A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.
- B. Arrange raceway supports to prevent misalignment during wiring installation.
- C. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- D. Group related raceway; support using conduit rack. Construct rack using steel channel specified in Section 16070; provide space on each for 25 percent additional raceways.
- E. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports
- F. Do not attach raceway to ceiling support wires or other piping systems.
- G. Construct wireway supports from steel channel specified in Section 16070.
- H. Route exposed raceway parallel and perpendicular to walls.
- I. Route raceway installed above accessible ceilings parallel and perpendicular to walls.
- J. Route conduit in and under slab from point-to-point.
- K. Maintain clearance between raceway and piping for maintenance purposes.
- L. Maintain 12 inch (300 mm) clearance between raceway and surfaces with temperatures exceeding 104 degrees F (40 degrees C).
- M. Cut conduit square using saw or pipe cutter; de-burr cut ends.
- N. Bring conduit to shoulder of fittings; fasten securely.

TECHNICAL SPECIFICATIONS

- O. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.
- P. Install conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
- Q. Install no more than equivalent of three 90 degree bends (270 degrees total) between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one-shot bender to fabricate or factory elbows for bends in metal conduit larger than 2 inch (50 mm) size.
- R. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.
- S. Install suitable pull string or cord in each empty raceway except sleeves and nipples.
- T. Install suitable caps to protect installed conduit against entrance of dirt and moisture.
- U. Surface Raceway: Install flat-head screws, clips, and straps to fasten raceway channel to surfaces; mount plumb and level. Install insulating bushings and inserts at connections to outlets and corner fittings.
- V. Close ends and unused openings in wireway.
- W. Use rigid metal conduit or PVC coated rigid steel conduit on all through slab transitions. Except through slab penetrations terminating at floor mounted equipment, and/or housekeeping pads may be PVC. Use rigid metal conduit elbows 2-lap wrapped with 20mil 3M Scotch wrap or tape or PVC coated rigid steel conduit on all underground/ underslab raceways 2 inches and larger.
- X. Use rigid steel conduit for all medium voltage feeders. Medium Voltage feeders located underground outside the building may be PVC encased in concrete per the Electrical Site Plan.
- Y. Use rigid steel conduit for all motor circuits where subject to physical damage or below 10' AFF.
- Z. Intermediate grade metal conduit, (threaded only), may be used in lieu of rigid steel conduit where allowed by NEC.
- AA. Use flexible conduit, "greenfield" for:
 - 1. Connection to vibrating equipment in dry locations between rigid conduit and connection box on equipment.
 - 2. Final connections to equipment in dry locations.
 - 3. Final connections to equipment requiring adjustments.
 - 4. Final connections to recessed lighting fixtures from conduit system.
 - 5. Connection to distribution transformers.
 - 6. Connection to bus duct plug-in switches.
 - 7. Maximum length 6'.

TECHNICAL SPECIFICATIONS

- BB. Use Liquidtight flexible conduit in damp or wet locations for same circuit categories listed for flexible conduit above. Engineer will determine "damp or wet" locations if questionable.
- CC. EMT shall not be installed underground and shall not be encased in concrete.
- DD. Conduit must be installed high enough above lay in ceiling to permit removal of ceiling panels and light fixtures.
- EE. In concrete slab on grade or elevated slabs: Conduit may penetrate slabs but will **NOT** be allowed to run in slabs on grade or elevated slabs.
- FF. Run conduit below the roofing assembly. In accordance with NEC 300.4 conduit may not be run exposed across roof.
- GG. Due to the corrosive nature of the soil all metal conduit, couplings, elbows and fittings in contact with the soil or buried below grade shall be factory coated with PVC or two-lap wrapped with 20 mil 3M Scotchwrap with Pipe Primer applied as recommended by Manufacturer. Make underground conduit fittings watertight using conductive compound tape. Do not use split couplings and similar fittings underground and exposed to moisture.
- HH. Route underground conduits minimum 24" below grade.
- II. Paint conduit threads exposed to moisture with exterior grade, rust preventive silver paint after installation.
- JJ. Where conduit crosses expansion joints, install expansion type fittings with bonding jumper. Use expansion joint with lateral conduit movement of 4" or 8" as indicated. When both vertical and lateral movement is expected the joint shall be a 1" braided flexible coupling allowing both directional movements.
- KK. For vertical conduit runs from the first floor to upper floors, each floor deck shall be considered an expansion joint. Provide expansion type fittings to allow for up to 2" movement in addition to any thermal expansion or contraction expected to occur.
- LL. Make connections to equipment away from wall with rigid or IMC conduit extensions exposed from ceiling to floor, anchored with floor flange and/or angle frame as required. Make connections to equipment with flexible conduit from tee conduit body in conduit riser.
- MM. Vibrating equipment and equipment requiring adjustment, i.e.: motors, transformers, etc: make final connections with liquid-tight flexible metal conduit.
- NN. Isolate conduit connections to equipment on roof from roof penetration of conduit with short section of liquid-tight flexible conduit between roof penetration and equipment to prevent leak in roof penetration due to equipment vibration.
- OO. Supports shall be installed in accordance with Seismic standards. Provide necessary side braces and swing joints as required. See Spec Section 16071 Seismic Protection for Electrical Equipment.

TECHNICAL SPECIFICATIONS

3.05 INSTALLATION - BOXES

- A. Install wall mounted boxes at elevations to accommodate mounting heights as indicated on Drawings.
- B. Adjust box location up to 10 feet prior to rough-in to accommodate intended purpose.
- C. Orient boxes to accommodate wiring devices oriented as specified in Section 16140.
- D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- E. In Accessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches (150 mm) from ceiling access panel or from removable recessed luminaire.
- F. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- G. Do not install flush mounting box back-to-back in walls; install with minimum 6 inches (150 mm) separation. Install with minimum 24 inches (600 mm) separation in rated walls.
- H. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- I. Install stamped steel bridges to fasten flush mounting outlet box between studs.
- J. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- K. Install adjustable steel channel fasteners for hung ceiling outlet box.
- L. Do not fasten boxes to ceiling support wires or other piping systems.
- M. Support boxes independently of conduit.
- N. Install gang box where more than one device is mounted together. Do not use sectional box.
- O. Install gang box with plaster ring for single device outlets.
- P. Seal boxes during construction to prevent entrance of construction debris.
- Q. Paint wiring connections in ground mounted outlets or floor outlets in wet locations with "Scotchkote" and fill box with "Duxseal".
- R. Where outlet boxes are installed in unfinished concrete walls or columns, provide 1" deep plaster ring with box and ring set in position before the concrete is poured so concrete will fill around the ring and cover plate can be installed flush with the unfinished surface. In case of brick walls, follow same procedure with mason filling around the plaster ring with mortar.

TECHNICAL SPECIFICATIONS

- S. Install all outlets located on columns or walls, provide 6" x 6" x 3" deep wood box placed in the forms before concrete is poured. Remove wood box before waterproofing is applied. General Contractor will waterproof wall and opening, after which Electrical Contractor will install outlet box. General Contractor will grout around box. Set boxes carefully so that cover plates will be flush with the surface and square.

3.06 INTERFACE WITH OTHER PRODUCTS

- A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods in accordance with Section 16070.
- B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation specified.
- C. Locate outlet boxes to allow luminaires positioned as indicated on Drawings.
- D. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.07 ADJUSTING

- A. General Conditions: Testing, adjusting, and balancing.
- B. Adjust flush-mounting outlets to make front flush with finished wall material.
- C. Install knockout closures in unused openings in boxes.

3.08 CLEANING

- A. General Conditions: Final cleaning.
- B. Clean interior of boxes to remove dust, debris, and other material.
- C. Clean exposed surfaces and restore finish.

END OF SECTION 16128

TECHNICAL SPECIFICATIONS

SECTION 16131 CABINETS AND ENCLOSURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Hinged cover enclosures.
 - 2. Cabinets.
 - 3. Terminal blocks.
 - 4. Accessories.

- B. Related Requirements:
 - 1. Section 16060 - Grounding and Bonding for Electrical Systems.
 - 2. Section 16070 - Hangers and Supports for Electrical Systems.
 - 3. Section 16128 - Raceway and Boxes for Electrical Systems.

1.02 REFERENCE STANDARDS

- A. National Electrical Manufacturers Association:
 - 1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 2. NEMA ICS 4 - Industrial Control and Systems: Terminal Blocks.

1.03 SUBMITTALS

- A. General Conditions: Submittal procedures.

- B. Product Data: Submit manufacturer's standard data for enclosures, cabinets, and terminal blocks.

- C. Manufacturer's Instructions: Submit application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

- D. Qualification Statements:
 - 1. Submit manufacturer experience qualifications.
 - 2. Submit manufacturer's approval of installer.

1.04 MAINTENANCE MATERIAL SUBMITTALS

- A. General Conditions: Requirements for maintenance materials.

- B. Extra Stock Materials:
 - 1. Furnish two of each key.

1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

TECHNICAL SPECIFICATIONS

PART 2 PRODUCTS

2.01 HINGED COVER ENCLOSURES

- A. Description: NEMA 250, Type 1 steel enclosure.
 - 1. Covers: Continuous hinge, held closed by latch operable by screwdriver.
 - 2. Furnish interior Metal panel for mounting terminal blocks and electrical components; finish with white enamel.
 - 3. Enclosure Finish: Manufacturer's standard enamel.

2.02 TERMINAL BLOCKS

- A. Description:
 - 1. Terminal Blocks: NEMA ICS 4.
 - 2. Power Terminals: Unit construction type with closed back and tubular pressure screw connectors, rated 600 volts.
 - 3. Signal and Control Terminals: Modular construction type, suitable for channel mounting, with tubular pressure screw connectors, rated 300 volts.
 - 4. Furnish ground bus terminal block, with each connector bonded to enclosure.

PART 3 EXECUTION

3.01 DEMOLITION

- A. Remove abandoned cabinets and enclosures, including abandoned cabinets and enclosures above accessible ceiling finishes. Patch surfaces.
- B. Maintain access to existing cabinets and enclosures and other installations remaining active and requiring access. Modify installation or provide access panel.
- C. Extend existing cabinets and enclosures using materials and methods compatible with existing electrical installations, or as specified.

3.02 INSTALLATION

- A. Install enclosures and boxes plumb. Anchor securely to wall and structural supports at each corner in accordance with Section 16070.
- B. Install cabinet fronts plumb.

3.03 CLEANING

- A. General Conditions: Final cleaning.
- B. Clean electrical parts to remove conductive and harmful materials.
- C. Remove dirt and debris from enclosure.
- D. Clean finishes and touch up damage.

END OF SECTION 16131

TECHNICAL SPECIFICATIONS

SECTION 16140 WIRING DEVICES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes wall switches; wall dimmers; wall and ceiling occupancy sensors; receptacles; multioutlet assembly; and device plates and decorative box covers.
- B. Related Sections:
 - 1. Section 16128 - Raceway and Boxes for Electrical Systems: Outlet boxes for wiring devices.

1.02 REFERENCES

- A. National Electrical Manufacturers Association:
 - 1. NEMA WD 1 - General Requirements for Wiring Devices.
 - 2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.03 SUBMITTALS

- A. General Conditions: Submittal procedures.
- B. Product Data: Submit manufacturer's catalog information showing dimensions, colors, and configurations.

1.04 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.05 EXTRA MATERIALS

- A. General Conditions: Spare parts and maintenance products.
- B. Furnish two of each style, size, of switch, receptacle type and finish wall plate.

PART 2 PRODUCTS

2.01 WALL SWITCHES

- A. Manufacturers:
 - 1. Cooper Wiring Devices.
 - 2. Harvey Hubbell, Inc.
 - 3. Leviton Manufacturing Company.
 - 4. P&S.
 - 5. Substitutions: Not permitted.

TECHNICAL SPECIFICATIONS

- B. Product Description: NEMA WD 1, Heavy-Duty, AC only general-use snap switch.
- C. Body and Handle: White plastic with toggle handle.
- D. Locator Light: Lighted handle type switch; red color handle.
- E. Ratings:
 - 1. Voltage: 120-277 volts, AC.
 - 2. Current: 20 amperes.

2.03 OCCUPANCY SENSORS AND POWER PACKS

- A. Occupancy Sensors
 - 1. Ceiling sensors.
 - 2. Wall sensors.
 - 3. Dual technology sensors shall:
 - a. Either corner mounted or ceiling mounted in such a way as to minimize coverage in unwanted areas
 - b. Passive infrared and ultrasonic technologies for occupancy detection. Products that react to noise or ambient sound shall not be considered.
 - 4. Ultrasonic sensors shall:
 - a. Utilize Advanced Signal Processing to adjust the detection threshold dynamically to compensate for constantly changing levels of activity and airflow throughout controlled space.
 - b. Have an ultrasonic operating frequency that is crystal controlled at 25 kHz within $\pm 0.005\%$ tolerance, 32 kHz within $\pm 0.002\%$ tolerance, or 40 kHz $\pm 0.002\%$ tolerance to assure reliable performance and eliminate sensor cross-talk. Sensors using multiple frequencies are not acceptable.
 - 5. All sensors shall be capable of operating normally with electronic ballasts, PL lamp systems and rated motor loads.
 - 6. Coverage of sensors shall remain constant after sensitivity control has been set. No automatic reduction shall occur in coverage due to the cycling of air conditioner or heating fans.
 - 7. All sensors shall have readily accessible, user adjustable settings for time delay and sensitivity. Settings shall be located on the sensor (not the control unit) and shall be recessed to limit tampering.
 - 8. In the event of failure, a bypass manual override shall be provided on each sensor. When bypass is utilized, lighting shall remain on constantly or control shall divert to a wall switch until sensor is replaced. This control shall be recessed to prevent tampering.
 - 9. All sensors shall provide an LED as a visual means of indication at all times to verify that motion is being detected during both testing and normal operation.
- B. Products
 - 1. Wall Mounted Single Level Motion Sensor Switch.
 - 2. Wall Mounted Bi-Level Motion Sensor Switch.
 - 3. Ceiling Mounted Dual Technology Occupancy Sensor with Power Pack (as required).
- C. Circuit Control Hardware – (Power Packs)

TECHNICAL SPECIFICATIONS

3. Control Units - For ease of mounting, installation and future service, control unit(s) shall be able to externally mount through a 1/2" knock-out on a standard electrical enclosure and be an integrated, self-contained unit consisting internally of an isolated load switching control relay and a transformer to provide low-voltage power. Control unit shall provide power to a minimum of two (2) sensors.
 4. Provide power packs as required. Power Pack shall be installed in jbox.
 5. Relay Contacts shall have ratings of:
 - a. 13A - 120 VAC Tungsten
 - b. 20A - 120 VAC Ballast
 - c. 20A - 277 VAC Ballast
 - d. 20A – 347 VAC Ballast
- D. Control wiring between sensors and control units shall be Class II, 18-20 AWG, stranded U.L. Classified, PVC insulated or TEFLON jacketed cable suitable for use in plenums, where applicable.
1. Minimum acceptable wire gauge from the circuit control hardware relays shall be #14 AWG.
- E. Mount switches and occupancy sensors as indicated on Drawings and by manufacturer's requirements.

CONTROL TYPE	COMMISSIONING AND CALIBRATION
Occupancy sensors	Ensure that the sensor is correctly placed and oriented per the specifications and/ or construction drawings. If unanticipated obstructions are present, it may be necessary to adjust the sensor location and orientation.
Occupancy sensors	Adjust the sensitivity and time delay of the occupancy sensor, and test to ensure it provides appropriate response. For optimal user acceptance, energy savings and lamp life, set the time delay initially for a minimum of 15 minutes (NEMA recommendation).
Daylight harvesting	All furnishings and interior finishes and materials should be installed before calibrating the sensors. Adjust the photosensor to determine the threshold for switching based on detected light level. It may be helpful to calibrate under normal daylight conditions and dusk conditions (it may be possible to close window blinds to approximate dusk). Record the calibration adjustments if possible and replicate in similar spaces.

TECHNICAL SPECIFICATIONS

Daylight Harvesting	Done
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2.04 RECEPTACLES

- A. Manufacturers:
 - 1. Cooper Wiring Devices.
 - 2. Harvey Hubbell, Inc.
 - 3. Leviton Manufacturing Company.
 - 4. P&S.
 - 5. Substitutions: Not permitted.
- B. Product Description: NEMA WD 1, Heavy-duty general use receptacle.
- C. Device Body: White or match existing, nylon. Provide red device for receptacles on standby emergency power.
- D. Configuration: NEMA WD 6, type as indicated on Drawings.
- E. Convenience Receptacle: Type 5-20.
- F. GFCI Receptacle: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.
- G. Isolated Ground Duplex – 20AMP.
 - 1. Faceplate is orange nylon with “ISOLATED GROUND” printed in black.

2.05 WALL PLATES

- A. Manufacturers:
 - 1. Cooper Wiring Devices.
 - 2. Harvey Hubbell, Inc.
 - 3. Leviton Manufacturing Company.
 - 4. P&S.
 - 5. Substitutions: Not permitted.
- B. Decorative Cover Plate: White or to match existing. Provide red cover/plate for red receptacle unless noted otherwise.
- C. Jumbo Cover Plate: White or to match existing.
- D. Weatherproof Cover Plate: Gasketed cast metal plate with hinged and gasketed device cover. System shall be weatherproof while in use.
- E. Wall plates for devices in laboratories, kitchen areas, mechanical rooms, and other similar areas shall be beveled edge stainless steel plates, single or multi-

TECHNICAL SPECIFICATIONS

gang as required by the outlet. Wall plates for devices in surface boxes, unless specified otherwise, shall be beveled edge satin finish stainless steel plates, single or multi-gang as required by the outlet. Blank plates shall be furnished and installed on all empty, blanked or unused outlets. Device plates manufactured by device manufacturer where available. Wall Plates shall be single and combination types that mate and match with corresponding devices.

2.06 MULTIOUTLET ASSEMBLY

- A. Manufacturers:
 - 6. Cooper Wiring Devices.
 - 7. Harvey Hubbell, Inc.
 - 8. Leviton Manufacturing Company.
 - 9. Wiremold.
 - 10. Substitutions: Not permitted.
- B. Multi-outlet Assembly: Sheet metal channel with fitted cover, with pre-wired receptacles, suitable for use as multi-outlet assembly.
- C. Size: As indicated on Drawings.
- D. Receptacles: Furnish covers and accessories to accept convenience receptacles specified in this Section.
- E. Receptacle Spacing: As indicated on Drawings.
- F. Receptacle Color: To match convenience receptacles and switches.
- G. Channel Finish: As indicated on drawings.
- H. Fittings: Furnish manufacturer's standard couplings, elbows, [outlet and device boxes,] and connectors

PART 3 EXECUTION

3.01 EXAMINATION

- A. General Conditions: Coordination and project conditions.
- B. Verify outlet boxes are installed at proper height.
- C. Verify wall openings are neatly cut and completely covered by wall plates.
- D. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.02 PREPARATION

- A. Clean debris from outlet boxes.

TECHNICAL SPECIFICATIONS

3.03 EXISTING WORK

- A. Disconnect and remove abandoned wiring devices.
- B. Modify installation to maintain access to existing wiring devices to remain active.
- C. Clean and repair existing wiring devices to remain or to be reinstalled.

3.04 INSTALLATION

- A. Install devices plumb and level.
- B. Install switches with OFF position down.
- C. Install receptacles with grounding pole on bottom.
- E. Connect wiring device grounding terminal to outlet box with bonding jumper and branch circuit equipment grounding conductor.
- F. Install wall plates on flush mounted switches, receptacles, and blank outlets.
- G. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
- H. Connect wiring devices by wrapping solid conductor around screw terminal. When stranded conductors are used in lieu of solid, use crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under device screws.
- I. Use jumbo size plates for outlets installed in masonry walls.
- J. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.
- K. Match devices to plug connectors for Owner-furnished equipment. Verify type, configuration, etc., prior to providing devices. Including all such costs in bid submission.

3.05 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate locations of outlet boxes provided under Section 16128 to obtain mounting heights as specified and as indicated on drawings.
- B. Install wall switch 48 inches above finished floor.
- C. Install convenience receptacle 18 inches above finished floor.
- D. Install convenience receptacle 6 inches above back splash of counter].
- E. Install dimmer 48 inches above finished floor.

TECHNICAL SPECIFICATIONS

3.06 FIELD QUALITY CONTROL

- A. General Conditions: Field inspecting, testing, adjusting, and balancing.
- B. Inspect each wiring device for defects.
- C. Operate each wall switch with circuit energized and verify proper operation.
- D. Verify each receptacle device is energized.
- E. Test each receptacle device for proper polarity.
- F. Test each GFCI receptacle device for proper operation.

3.07 ADJUSTING

- A. General Conditions: Testing, adjusting, and balancing.
- B. Adjust devices and wall plates to be flush and level.

3.08 CLEANING

- A. General Conditions: Final cleaning.
- B. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION 16140

TECHNICAL SPECIFICATIONS

SECTION 16149 LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Occupancy sensors.
 - 2. Photocells.
 - 3. Photocell control unit.

- B. Related Sections:
 - 1. Section 16040 - Identification for Electrical Systems: Product requirements for electrical identification items for placement by this section.
 - 2. Section 16123 - Building Wire and Cable.
 - 3. Section 16128 - Raceway and Boxes for Electrical Systems: Product requirements for raceway and boxes for placement by this section.
 - 4. Section 16140 - Wiring Devices: Product requirements for wiring devices for placement by this section.
 - 5. Section 16150 - Wiring Connections: Execution requirements for electric connections specified by this section.
 - 6. Section 16442 - Panelboards.

1.02 REFERENCES

- A. National Electrical Manufacturers Association:
 - 1. NEMA FU 1 - Low Voltage Cartridge Fuses.
 - 2. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contractors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
 - 3. NEMA ICS 4 - Industrial Control and Systems: Terminal Blocks.
 - 4. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices.
 - 5. NEMA ICS 6 - Industrial Control and Systems: Enclosures.
 - 6. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

1.03 SYSTEM DESCRIPTION

- A. Where indicated on drawings or required by applicable code, provide automatic shutoff for lighting inside building larger than 5000 square feet (465 square meters). Control shutoff by method conforming to ICC IECC.

- B. Where indicated on drawings or required by applicable code, provide automatic shutoff for lighting outside building. Control shutoff by method conforming to ICC IECC.

- C. Extent of lighting control system work is indicated by drawings and by the requirements of this section. It is the intent of this section to provide an integrated, energy saving lighting control system including Occupancy Sensors, and Daylighting Controls from a single supplier. Contractor is responsible for confirming that the panel and sensors interoperate as a single system.

1.04 SUBMITTALS

- A. General Conditions: Requirements for submittals.

TECHNICAL SPECIFICATIONS

- B. Shop Drawings: Indicate dimensioned drawings of lighting control system components and accessories.
 - 1. Include typical wiring diagrams for each component.
 - 2. Detailed point to point wiring diagrams and floor plans showing occupancy and daylighting sensor locations.
 - 3. Provide typical mounting details for all equipment and devices.
 - 4. Sample calibration log.
 - 5. Provide Source Code and Source Code Licenses for all equipment that is computer driven. Provide Development licenses so Source Code can be examined. These Development Licenses, along with all software licenses shall become property of the Owner. Third parties will be allowed to use the software as necessary for this project.
- C. Product Data: Submit manufacturer's standard product data for each system component.
- D. Manufacturer's Installation Instructions: Submit for each system component.
- E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.05 CLOSEOUT SUBMITTALS

- A. General Conditions: Requirements for submittals.
- B. Project Record Documents: Record the following information:
 - 1. Actual locations of components and record circuiting and switching arrangements.
 - 2. Wiring diagrams reflecting field installed conditions with identified and numbered, system components and devices.
- C. Operation and Maintenance Data:
 - 1. Submit replacement parts numbers.
 - 2. Submit manufacturer's published installation instructions and operating instructions.
 - 3. Recommended renewal parts list.
 - 4. Submit final calibration log.

1.06 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in the manufacture of lighting control equipment and ancillary equipment, of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Comply with NEC, NEMA, and FCC Emission requirements for Class A applications.

1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. The contractor shall be completely responsible for providing a system meeting this specification in its entirety. All deviations from this specification must be listed and individually signed off by the consultant.
 - 1. Sensor Switch
 - 2. Wattstopper.

TECHNICAL SPECIFICATIONS

1.08 PRE-INSTALLATION MEETINGS

- A. General Conditions: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. General Conditions: Requirements for transporting, handling, storing, and protecting products.
- B. Accept components on site in manufacturer's packaging. Inspect for damage.
- C. Protect components by storing in manufacturer's containers indoor protected from weather.

1.10 WARRANTY

- A. General Conditions: Requirements for warranties.
- B. Furnish five year manufacturer warranty for components.

1.11 EXTRA MATERIALS

- A. General Conditions: Requirements for extra materials.
- B. Furnish 20% spare (minimum 1) of each occupancy sensor type installed.
- C. Furnish 10% spare (minimum 1) of each photocell type installed.

PART 2 PRODUCTS

2.01 OCCUPANCY SENSORS AND POWER PACKS

- A. Occupancy Sensors
 - 1. All products listed shall integrate fully with the daylighting controls listed in the project specifications.
 - 2. Ceiling sensors.
 - 3. Wall sensors.
 - 4. Dual technology sensors shall:
 - a. Provide dual technology sensors, unless noted otherwise.
 - b. Either corner mounted or ceiling mounted in such a way as to minimize coverage in unwanted areas
 - c. Passive infrared and ultrasonic technologies for occupancy detection. Products that react to noise or ambient sound shall not be considered.
 - 5. Ultrasonic sensors shall:
 - a. Utilize Advanced Signal Processing to adjust the detection threshold dynamically to compensate for constantly changing levels of activity and airflow throughout controlled space.
 - b. Have an ultrasonic operating frequency that is crystal controlled at 25 kHz within $\pm 0.005\%$ tolerance, 32 kHz within $\pm 0.002\%$ tolerance, or 40 kHz $\pm 0.002\%$ tolerance to assure reliable performance and eliminate sensor cross-talk. Sensors using multiple frequencies are not acceptable.

TECHNICAL SPECIFICATIONS

6. All sensors shall be capable of operating normally with electronic ballasts, PL lamp systems and rated motor loads.
7. Coverage of sensors shall remain constant after sensitivity control has been set. No automatic reduction shall occur in coverage due to the cycling of air conditioner or heating fans.
8. All sensors shall have readily accessible, user adjustable settings for time delay and sensitivity. Settings shall be located on the sensor (not the control unit) and shall be recessed to limit tampering.
9. In the event of failure, a bypass manual override shall be provided on each sensor. When bypass is utilized, lighting shall remain on constantly or control shall divert to a wall switch until sensor is replaced. This control shall be recessed to prevent tampering.
10. All sensors shall provide an LED as a visual means of indication at all times to verify that motion is being detected during both testing and normal operation.

B. Products

1. Wall Mounted Single Level Motion Sensor Switch.
2. Wall Mounted Bi-Level Motion Sensor Switch.
3. Ceiling Mounted Dual Technology Occupancy Sensor with Power Pack as required.
4. Daylight Sensor

C. Circuit Control Hardware – (Power Packs)

1. Control Units - For ease of mounting, installation and future service, control unit(s) shall be able to externally mount through a 1/2" knock-out on a standard electrical enclosure and be an integrated, self-contained unit consisting internally of an isolated load switching control relay and a transformer to provide low-voltage power. Control unit shall provide power to a minimum of two (2) sensors.
2. Relay Contacts shall have ratings of:
 - a. 13A - 120 VAC Tungsten
 - b. 20A - 120 VAC Ballast
 - c. 20A - 277 VAC Ballast
 - d. 20A – 347 VAC Ballast

C. Control wiring between sensors and control units shall be Class II, 18-20 AWG, stranded U.L. Classified, PVC insulated or TEFLON jacketed cable suitable for use in plenums, where applicable.

1. Minimum acceptable wire gauge from the circuit control hardware relays shall be #14 AWG.

2.02 EXTERIOR PHOTOCELLS

- A. Each photocell shall be mounted in the appropriate location for measuring the available daylight. Each photocell will have a separate control/calibration module mounted separately and in an accessible location.
- B. The control module shall:
 1. Have a separate trip point settings. These settings will be entered via easily readable dial switches.
 2. Have a fixed deadband of 10%.
 3. Have a starting delay.
 4. Be suitable for panel mounting.
 5. Be UL listed.

PART 3 EXECUTION

TECHNICAL SPECIFICATIONS

3.01 INSTALLATION

- A. Mount switches, occupancy sensors, and photocells as indicated on Drawings and by manufacturer's requirements.
- B. Install wiring in accordance with Section 16123.
- D. Use only properly color coded, stranded wire. Install wire sizes as indicated on Drawings. Install wire in conduit in accordance with Section 16128.
- E. Label each low voltage wire clearly indicating connecting relay panel. Refer to Section 16075.
- F. Identify power wiring with circuit breaker number controlling load. When multiple circuit breaker panels are feeding into relay panel, label wires to indicate originating panel designation.
- G. Label each low voltage wire with relay number at each switch or sensor.

3.02 SUPPORT SERVICES

Service Description:

- A. System Startup
 - 1. Manufacturer shall have a factory authorized technician confirm proper installation and operation of all system components. The startup requirement is intended to verify:
 - a. That all occupancy and daylight harvesting sensors are located, installed, and adjusted as intended by the factory and the contract documents.
 - b. The occupancy and daylight harvesting sensors are operating within the manufacturers specifications.
 - c. The sensors and relay panels interact as a complete and operational system to meet the design intent.
 - 2. Manufacturer to provide minimum of two day factory start-up at site. Additional days shall be included as required
 - 3. Manufacturer to provide a written statement verifying that the system meets the above requirements.
- B. Training
 - 1. Manufacturer shall provide factory authorized technician to train owner personnel in the operation, programming and maintenance of the lighting control system including all occupancy sensors and controls.
 - 2. Manufacturer shall provide minimum of one day on site training.
 - 3. Training shall be video recorded and provided to Owner on a DVD.
- C. Factory Commissioning
 - 1. Manufacturer shall provide factory authority technician for on site Commissioning Agent Testing. Number of days on-site shall be as necessary based on number of components and systems.
 - 2. Factory Commissioning shall include:
 - a. Fine tune occupancy sensors.
 - b. Program daylight harvesting.
 - c. Program relay panels,
 - d. Program dimming panels.

TECHNICAL SPECIFICATIONS

- e. Fine tune dimming controls.

3.03 ADJUSTING AND CALIBRATING

- A. General Conditions: Requirements for starting and adjusting.
- B. Test each system component after installation to verify proper operation.
- C. Test relays, contactors, and switches after installation to confirm proper operation.
- D. Confirm correct loads are recorded on directory card in each panel.
- E. Provide calibration logs for all devices. Sample log shall be part of shop drawing submittal.

CONTROL TYPE	COMMISSIONING AND CALIBRATION
Occupancy sensors and photosensors	Ensure that the sensor is correctly placed and oriented per the specifications and/ or construction drawings. If unanticipated obstructions are present, it may be necessary to adjust the sensor location and orientation.
Occupancy sensors	Adjust the sensitivity and time delay of the occupancy sensor, and test to ensure it provides appropriate response. For optimal user acceptance, energy savings and lamp life, set the time delay initially for a minimum of 15 minutes (NEMA recommendation).
Daylight harvesting	All furnishings and interior finishes and materials should be installed before calibrating the sensors. Adjust the photosensor to determine the threshold for switching based on detected light level. It may be helpful to calibrate under normal daylight conditions and dusk conditions (it may be possible to close window blinds to approximate dusk). Record the calibration adjustments if possible and replicate in similar spaces.

END OF SECTION 16149

TECHNICAL SPECIFICATIONS

SECTION 16150 WIRING CONNECTIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes electrical connections to equipment.
- B. Related Sections:
 - 1. Section 16123 - Building Wire and Cable.
 - 2. Section 16128 - Raceway and Boxes for Electrical Systems.

1.02 REFERENCES

- A. National Electrical Manufacturers Association:
 - 1. NEMA WD 1 - General Requirements for Wiring Devices.
 - 2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.03 SUBMITTALS

- A. General Conditions: Submittal procedures.
- B. Product Data: Submit wiring device manufacturer's catalog information showing dimensions, configurations, and construction.
- C. Manufacturer's installation instructions.

1.04 CLOSEOUT SUBMITTALS

- A. General Conditions: Submittal procedures.
- B. Project Record Documents: Record actual locations, sizes, and configurations of equipment connections.

1.05 COORDINATION

- A. General Conditions: Coordination and project conditions.
- B. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
- C. Determine connection locations and requirements.
- D. Sequence rough-in of electrical connections to coordinate with installation of equipment.
- E. Sequence electrical connections to coordinate with start-up of equipment.

TECHNICAL SPECIFICATIONS

PART 2 PRODUCTS

2.01 CORD AND PLUGS

- A. Attachment Plug Construction: Conform to NEMA WD 1.
- B. Configuration: NEMA WD 6; match receptacle configuration at outlet furnished for equipment.
- C. Cord Construction: Type SO multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
- D. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

PART 3 EXECUTION

3.01 EXAMINATION

- A. General Conditions: Coordination and project conditions.
- B. Verify equipment is ready for electrical connection, for wiring, and to be energized.

3.02 EXISTING WORK

- A. Remove exposed abandoned equipment wiring connections, including abandoned connections above accessible ceiling finishes.
- B. Disconnect abandoned utilization equipment and remove wiring connections. Remove abandoned components when connected raceway is abandoned and removed. Install blank cover for abandoned boxes and enclosures not removed.
- C. Extend existing equipment connections using materials and methods as specified.

3.03 INSTALLATION

- A. Make electrical connections.
- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations and to motors.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Install receptacle outlet to accommodate connection with attachment plug.
- E. Install cord and cap for field-supplied attachment plug.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

TECHNICAL SPECIFICATIONS

- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

3.04 ADJUSTING

- A. General Conditions: Testing, adjusting, and balancing.
- B. Cooperate with utilization equipment installers and field service personnel during checkout and starting of equipment to allow testing and balancing and other startup operations. Provide personnel to operate electrical system and checkout wiring connection components and configurations.

END OF SECTION 16150

TECHNICAL SPECIFICATIONS

SECTION 16411 ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Fusible.
 - 2. Nonfusible switches.
- B. Related Requirements:
 - 1. Section 16070 - Hangers and Supports for Electrical Systems.
 - 2. Section 16040 - Identification for Electrical Systems.
 - 3. Section 16491 - Fuses.

1.02 REFERENCE STANDARDS

- A. National Electrical Manufacturers Association:
 - 1. NEMA FU 1 - Low Voltage Cartridge Fuses.
 - 2. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
- B. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.03 SUBMITTALS

- A. General Conditions: Submittal procedures.
- B. Product Data: Submit switch ratings and enclosure dimensions.

1.04 CLOSEOUT SUBMITTALS

- A. General Conditions: Closeout procedures.
- B. Project Record Documents: Record actual locations of enclosed switches and ratings of installed fuses.

1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

TECHNICAL SPECIFICATIONS

PART 2 PRODUCTS

2.01 FUSIBLE SWITCH ASSEMBLIES

- A. Description: NEMA KS 1, Type HD, enclosed load interrupter knife switch. Handle lockable in OFF position.
- B. Operation:
 - 1. Switch Ratings
 - a. Switch Rating: Horsepower rated for AC or DC as indicated on Drawings.
 - b. Short Circuit Current Rating: UL listed for 10,000 rms symmetrical amperes when used with or protected by Class H or K fuses (30-600 ampere).
200,000 rms symmetrical amperes when used with or protected by Class L fuses (800-1200 ampere).
- C. Materials:
 - 1. Fuse clips: Designed to accommodate NEMA FU 1, Class R fuses.
 - 2. Enclosure: NEMA KS 1, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray enamel.
 - a. Interior Dry Locations: Type 1.
 - b. Exterior Locations: Type 3R.
 - 3. Service Entrance: Switches identified for use as service equipment are to be labeled for this application. Furnish solid neutral assembly and equipment ground bar.
 - 4. Furnish switches with entirely copper current carrying parts.

2.02 NONFUSIBLE SWITCH ASSEMBLIES

- A. Description: NEMA KS 1, Type HD enclosed load interrupter knife switch. Handle lockable in OFF position.
- B. Operation:
 - 1. Switch Ratings
 - a. Switch Rating: Horsepower rated for AC or DC as indicated on Drawings.
 - b. Short Circuit Current Rating: UL listed for 10,000 rms symmetrical amperes when used with or protected by Class H or K fuses (30-600 ampere).
[200,000 rms symmetrical amperes when used with or protected by Class L fuses (800-1200 ampere)].
- C. Materials:
 - 1. Enclosure: NEMA KS 1, to meet conditions. Fabricate enclosure from [steel finished with manufacturer's standard gray enamel.
 - a. Interior Dry Locations: Type 1.
 - b. Exterior Locations: Type 3R.
 - 2. Service Entrance: Switches identified for use as service equipment are to be labeled for this application. Furnish solid neutral assembly and equipment ground bar.
 - 3. Furnish switches with entirely copper current carrying parts.

TECHNICAL SPECIFICATIONS

PART 3 EXECUTION

3.01 DEMOLITION

- A. Disconnect and remove abandoned enclosed switches.
- B. Maintain access to existing enclosed switches and other installations remaining active and requiring access. Modify installation or provide access panel [specified in Section 08310.

3.02 INSTALLATION

- A. Install enclosed switches where indicated. Secure switches to building or equipment surface as shown. Where the surface is not adaptable for mounting, provide unistrut P-1000 rack mounted as required to secure switch.
- B. Install enclosed switches plumb. Provide supports in accordance with Section 16070.
- C. Height: 5 feet (1500 mm) to operating handle.
- D. Install fuses for fusible disconnect switches. Refer to Section 16491 for product requirements.
- E. Install engraved plastic nameplates in accordance with Section 16040. Engrave nameplates with the equipment served and the panel and circuit number supplying the switch.
- F. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.
- G. Secure switches and circuit breakers to building structure in accordance with seismic zone specified in other sections of this specification.
- H. All exterior mounted switches shall comply with NEC 312.2.
- I. All switches shall be mounted to comply with NEC 404.8.

3.03 REPAIR

- A. Repair existing enclosed switches to remain or to be reinstalled....

3.2 FIELD QUALITY CONTROL

- A. General Conditions: Requirements for testing, adjusting, and balancing.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.5.

3.3 CLEANING

- A. General Conditions: Requirements for cleaning.

TECHNICAL SPECIFICATIONS

- B. Clean existing enclosed switches to remain or to be reinstalled.

END OF SECTION 16411

TECHNICAL SPECIFICATIONS

SECTION 16415 MOTOR STARTERS (SEPARATELY MOUNTED)

PART 1 - GENERAL

1.01 RELATED SECTIONS

- A. **Drawings and general provisions of the Contract, Including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.**

1.02 DESCRIPTION OF WORK

- A. Furnish and install motor controllers for all integral or fractional horsepower motors, not controlled by magnetic starters installed in motor control centers, or magnetic starters provided as an integral component of a specific piece of equipment.
- B. Mount and wire starters furnished under other Divisions.

1.03 SUBMITTALS

- A. Provide shop drawings for all starters per Electrical Submittals Section 16020.

1.04 STANDARDS

- A. UL Standard No. 508.
- B. ANSI Standard No. ICS1 , ICS2, ICS4 and ICS6.

PART 2 - PRODUCTS

2.01 DEVICES

- A. Full Voltage Starters:
 - 1. Use NEMA grade starters. Use Minimum NEMA Sizes for motor served. Provide starter size as shown on the drawings unless larger size is required for actual motor controlled.
 - 2. All starters shall be rated for 600 volts, 60 hertz and complete with thermal overload protection in each ungrounded phase conductor.
 - 3. All starters shall be full voltage, non-reversing, across the line, unless noted otherwise.
 - 4. All starters shall be mounted in NEMA 1, general purpose, or NEMA 4, watertight, steel enclosure as shown.
 - 5. Overload protection shall be provided by solid state electronic overload relays with user selectable setting.

TECHNICAL SPECIFICATIONS

6. Starters shall be provided with phase loss protection.
 7. Starters shall be provided with phase unbalance protection.
 8. Furnish all magnetic starters with the following auxiliary devices:
 - a. Reset button in front cover to reset overload relays.
 - b. H-O-A (Hand-Off-Auto) Switch.
 - c. Pilot lights, 120 volt LEDs: red-run, green-stop.
 - d. Solid state overload relays.
 - e. Control circuit disconnect relays consisting of oil tight relays, as required to disconnect all external sources of control voltage entering the starter when the disconnect is open. Relays shall be located so all terminals in the starter are de-energized. Equivalent disconnecting terminal blocks will be allowed if accepted by Engineer.
 - f. Control voltage shall be 120 volts provided from a control power transformer built into each starter. Provide primary and secondary fusing for control transformers. Minimum CPI size is 50 VA
 - g. Auxiliary contacts shall be provided as required for the control scheme. Furnish 2-N.O. and 2-N.C. auxiliary contacts each starter as a minimum.
 9. Where shown, provide combination disconnect/starter furnished with horsepower rated heavy duty, fusible, disconnect switch. Furnish Type K5, one-time dual element rejection type fuses, current-limiting rated for 100 KA symmetrical fault, in accordance with NEMA FU1. Switches shall be externally operated, quick-make, quick-break, with an on/off indicating operating handle which can be locked open with a padlock.
- 2-
- C. All overcurrent devices shall have capability of being locked-out in compliance with OSHA Standard 1910.147.
 - D. Acceptable Starter Manufacturers
 1. Allen-Bradley Co.
 2. G.E. Co.
 3. Square D Co.
 4. ABB Power Distribution, Inc.
 5. Eaton/Cutler-Hammer

Formatted: Bullets and Numbering

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Refer to the Electrical Identification Section 16040 for identification of devices and enclosures.
- B. Verify and coordinate control devices required by control contractor prior to ordering starter. Furnish required devices.
- C. Securely mount starters to the building or equipment surface as shown. Where the surface is not adaptable for mounting, provide the Unistrut P-1000 rack to provide secure mounting.

TECHNICAL SPECIFICATIONS

- D. Clean all enclosures of all dirt and debris before final acceptance and checkout.

END OF SECTION 16415

TECHNICAL SPECIFICATIONS

SECTION 16442 PANELBOARDS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Distribution and branch circuit panelboards.
 - 2. Electronic grade branch circuit panelboards.
- B. Related Requirements:
 - 1. Section 16060 - Grounding and Bonding for Electrical Systems.
 - 2. Section 16040 - Identification for Electrical Systems.
 - 3. Section 16491 - Fuses.

1.02 REFERENCE STANDARDS

- A. Institute of Electrical and Electronics Engineers:
 - 1. IEEE C62.41 - Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
- B. National Electrical Manufacturers Association:
 - 1. NEMA FU 1 - Low Voltage Cartridge Fuses.
 - 2. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
 - 3. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices.
 - 4. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
 - 5. NEMA PB 1 - Panelboards.
 - 6. NEMA PB 1.1 - General Instructions for Proper Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less.
- C. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- D. National Fire Protection Association:
 - 1. NFPA 70 - National Electrical Code.
- E. Underwriters Laboratories Inc.:
 - 1. UL 50 - Cabinets and Boxes
 - 2. UL 67 - Safety for Panelboards.
 - 3. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.
 - 4. UL 1283 - Electromagnetic Interference Filters.
 - 5. UL 1449 - Transient Voltage Surge Suppressors.
 - 6. UL 1699 - Arc-Fault Circuit Interrupters.

TECHNICAL SPECIFICATIONS

1.03 SUBMITTALS

- A. General Conditions: Requirements for submittals.
- B. Product Data: Submit catalog data showing specified features of standard products.
- C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.
- D. Source Quality control submittals: Indicate results of factory tests and inspections.
- E. Field Quality Control Submittals: Indicate results of Contractor furnished tests and inspections.

1.04 CLOSEOUT SUBMITTALS

- A. General Conditions: Requirements for submittals.
- B. Project Record Documents: Record actual locations of panelboards and record actual circuiting arrangements.
- C. Operation and Maintenance Data: Submit spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.05 MAINTENANCE MATERIAL SUBMITTALS

- A. General Conditions: Requirements for maintenance products.
- B. Extra Stock Materials:
 - 1. Furnish two of each panelboard key. Panelboards keyed alike.

1.06 QUALITY ASSURANCE

- A. Qualifications
 - 1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 DISTRIBUTION PANELBOARDS

- A. Manufacturer List:

TECHNICAL SPECIFICATIONS

Manufacturer	Lighting Panels rated 240V	Lighting Panels rated 480/277V	Distribution Panels rated 600V
Square D	NQOD	NF	I-Line
GE	AQ	AE	Spectra
Eaton Cutler-Hammer	Pow-R-Line 1A	Pow-R-Line 2A	Pow-R-Line 4B
Siemens	S1	S2	S5

- B. Substitution Limitations:
 - 1. General Conditions: Requirements for substitutions for other manufacturers and products.

- C. Description: NEMA PB 1, circuit breaker type panelboard.

- D. Operation:
 - 1. Service Conditions:
 - a. Temperature: 100 degrees F.
 - b. Altitude: 4500 feet.
 - 2. Minimum integrated short circuit rating: 10,000 amperes rms symmetrical for 208 volt panelboards; 14,000 amperes rms symmetrical for 480 volt panelboards, or as indicated on Drawings.

- E. Materials
 - 1. Panelboard Bus: Copper, current carrying components, ratings as indicated on Drawings. Furnish copper ground bus in each panelboard.
 - 2. Molded Case Circuit Breakers: UL 489, circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Furnish circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.
 - 3. Molded Case Circuit Breakers with Current Limiters: UL 489, circuit breakers with replaceable current limiting elements, in addition to integral thermal and instantaneous magnetic trip in each pole.
 - 4. Current Limiting Molded Case Circuit Breakers: UL 489, circuit breakers with integral thermal and instantaneous magnetic trip in each pole, coordinated with automatically resetting current limiting elements in each pole. Interrupting rating 100,000 symmetrical amperes, let-through current and energy level less than permitted for same size NEMA FU 1, Class RK-5 fuse.
 - 5. Surge Suppressors: Integrated in panelboard, refer to Section 16261.
 - 6. Enclosure: NEMA PB 1, Type 1 or as required to meet service conditions.
 - 7. Cabinet Front: Surface door-in-door type, fastened with concealed trim clamps, hinged door with flush lock and plastic directory card holder. Fronts shall have cylindrical tumbler type lock with catch and spring-loaded door pull. All lock assemblies shall be keyed alike.

TECHNICAL SPECIFICATIONS

8. Circuit breaker accessories: Trip units and auxiliary switches as indicated on drawings.

F. Finishes

1. Manufacturer's standard gray enamel.

2.02 BRANCH CIRCUIT PANELBOARDS

A. Manufacturer List:

Manufacturer	Lighting Panels rated 240V	Lighting Panels rated 480/277V	Distribution Panels rated 600V
Square D	NQOD	NF	I-Line
GE	AQ	AE	Spectra
Eaton Cutler-Hammer	Pow-R-Line 1A	Pow-R-Line 2A	Pow-R-Line 4B
Siemens	S1	S2	S5

B. Substitution Limitations:

1. General Conditions: Requirements for substitutions for other manufacturers and products.

C. Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.

D. Materials:

1. Panelboard Bus: Copper, current carrying components, ratings as indicated on Drawings. Furnish copper ground bus in each panelboard.
2. For non-linear load applications subject to harmonics furnish 200 percent rated, plated copper, solid neutral.
3. Minimum Integrated Short Circuit Rating: 10,000 amperes rms symmetrical for 208 volt panelboards; 14,000 amperes rms symmetrical for 480 volt panelboards, or as indicated on Drawings.
4. Molded Case Circuit Breakers: UL 489, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles, listed as Type SWD for lighting circuits, Type HACR for air conditioning equipment circuits, Class A ground fault interrupter circuit breakers as indicated on Drawings. Provide UL class 760 arc-fault interrupter circuit breakers as indicated on Drawings. Do not use tandem circuit breakers.
5. Current Limiting Molded Case Circuit Breakers: UL 489, circuit breakers with integral thermal and instantaneous magnetic trip in each pole, coordinated with automatically resetting current limiting elements in each pole. Interrupting rating 100,000 symmetrical amperes, let-through current and energy level less than permitted for same size NEMA FU 1, Class RK-5 fuse.
6. [Surge Suppressor: Integrated in panelboard, refer to Section 16289.]
7. Enclosure: NEMA PB 1, Type 1 or Type 3R as required to meet service conditions.
8. Split solid neutral shall be plated and located in the main compartment up to 225 amperes so incoming neutral cable may be of the same length. UL listed

TECHNICAL SPECIFICATIONS

- paneboards with 200% rated solid neutral shall be plated copper for non-linear load applications. Panelboards shall be marked for non-linear load applications.
9. Interior trim shall be of dead-front construction to shield user from energized parts. Dead-front trim shall have pre-formed twist-outs covering unused mounting space.
 10. Breaker handle and faceplate shall indicate rated ampacity. Standard construction circuit breakers shall be UL listed for reverse connection without restrictive line or load markings. Circuit breaker handle accessories shall provide provisions for locking handle in the OFF position.
- E. Cabinet Front: Door-in-door Flush or Surface cabinet front as indicated on drawings with concealed trim clamps, concealed hinge, plastic directory card holder, and flush lock keyed alike. Front shall have cylindrical tumbler type lock with catch and spring-loaded door pull. All lock assemblies shall be keyed alike. Finishes:
1. Finish in manufacturer's standard gray enamel.

2.03 SOURCE QUALITY CONTROL

- A. General Conditions: Testing, inspection and analysis requirements.
- B. Independently test integral surge suppressers with category C3 high exposure waveform 20 kV-1.2/50us, 10kA-8/20 us per IEEE C62.41.

PART 3 EXECUTION

3.01 DEMOLITION

- A. Maintain access to existing panelboard and load centers remaining active and requiring access. Modify installation or provide access panel.

3.02 INSTALLATION

- A. Install panelboards in accordance with NEMA PB 1.1.
- B. Install panelboards plumb.
- C. Install recessed panelboards flush with wall finishes.
- D. Height: 6 feet (1800 mm) to top of panelboard install panelboards taller than 6 feet (1800 mm) with bottom no more than 4 inches (100 mm) above floor.
- E. Install filler plates for unused spaces in panelboards.
- F. Provide typed circuit directory for each branch circuit panelboard [and load center]. Revise directory to reflect circuiting changes to balance phase loads. Identify each circuit as to its clear, evident and specific purpose of use.
- G. Install engraved plastic nameplates in accordance with Section 16075.

TECHNICAL SPECIFICATIONS

- H. Install spare conduits out of each recessed panelboard to accessible location above ceiling and below slab not on grade. Minimum spare conduits: 5 empty 1 inch (DN27) (above and below). Identify each as SPARE.
- I. Ground and bond panelboard enclosure according to Section 16060. Connect equipment ground bars of panels in accordance with NFPA 70.
- J. Provide each panelboard with nameplate showing panel designation, voltage rating and phase. Indicate source of power (feeder origin) and feeder size (awg/mils and conduit).
- K. Label shall be engraved laminated-plastic nameplate. Nameplates shall be black with white letters (normal power).
- L. Mount panelboards securely to building structure with 3/8" minimum diameter galvanized bolts and inserts number as required for size of panel, but not less than 4. Mount panelboards with centerline 4'-6" approximately above finished floor with the top a maximum of 74" AFF. Where panels of different heights are mounted adjacent, install top of panel trim at same height above floor. Close all unused openings.
- M. Mount feeder panelboards taller than 66" on 4" high 2500# concrete pad and bolt to wall and pad with 1/2" diameter bolts and inserts. Breaker handles in the "ON" position shall not be higher than 6-7" to centerline from the Finished Floor when panelboards are installed on concrete pads
- N. Where two sets of feeder cables are required in panel gutter space, run one set in each side of panel.
- O. Provide seismic bracing in accordance with the manufacturer's recommendations and in compliance with the seismic zone requirements for the zone in which the equipment is located.
- P. Connect only one wire/cable to each breaker terminal.

3.03 FIELD QUALITY CONTROL

- A. General Conditions: Requirements for testing, adjusting, and balancing.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform circuit breaker inspections and tests listed in NETA ATS, Section 7.6.
- D. Perform switch inspections and tests listed in NETA ATS, Section 7.5.
- E. Perform controller inspections and tests listed in NETA ATS, Section 7.16.1.

3.04 ADJUSTING

- A. General Conditions: Requirements for starting and adjusting.

TECHNICAL SPECIFICATIONS

- B. Measure steady state load currents at each panelboard feeder; rearrange circuits in panelboard to balance phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

3.05 CLEANING

- A. General Conditions: Requirements for cleaning.
- B. Clean existing panelboards to remain or to be reinstalled.

END OF SECTION 16442

TECHNICAL SPECIFICATIONS

SECTION 16491 FUSES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes fuses and spare fuse cabinet.

1.02 REFERENCES

- A. National Electrical Manufacturers Association:
 - 1. NEMA FU 1 - Low Voltage Cartridge Fuses.

1.03 DESIGN REQUIREMENTS

- A. Select fuses to provide appropriate levels of short circuit and overcurrent protection for the following components: wire, cable, bus structures, and other equipment. Design system to maintain component damage within acceptable levels during faults.
- B. Select fuses to coordinate with time current characteristics of other overcurrent protective elements, including other fuses, circuit breakers, and protective relays. Design system to maintain operation of device closest to fault operates.

1.04 FUSE PERFORMANCE REQUIREMENTS

- A. Power Load Feeder Switches: Class RK1 (time delay).
- B. Motor Load Feeder Switches: Class RK1 (time delay).
- C. Lighting Load Feeder Switches: Class RK1 (time delay).
- D. Other Feeder Switches Larger than 600 amperes: Class L time delay.
- E. Other Feeder Switches: Class RK1 (time delay).
- F. General Purpose Branch Circuits: Class RK1 (time delay).
- G. Motor Branch Circuits: Class RK1 (time delay).
- H. Lighting Branch Circuits: Class G.

1.05 SUBMITTALS

- A. General Conditions: Submittal procedures.

TECHNICAL SPECIFICATIONS

- B. Product Data: Submit data sheets showing electrical characteristics, including time-current curves.

1.06 CLOSEOUT SUBMITTALS

- A. General Conditions: Closeout procedures.
- B. Project Record Documents: Record actual sizes, ratings, and locations of fuses.

1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.08 MAINTENANCE MATERIALS

- A. General Conditions: Spare parts and maintenance products.

1.09 EXTRA MATERIALS

- A. General Conditions: Requirements for extra materials.
- B. Furnish 20% spare fuses of each Class, size, and rating installed.

PART 2 PRODUCTS

2.01 FUSES

- A. Manufacturers:
 - 1. Bussman
 - 2. Gould Shawmut
 - 3. Substitutions: General Conditions
- B. Dimensions and Performance: NEMA FU 1, Class as specified or as indicated on Drawings.
- C. Voltage: Rating suitable for circuit phase-to-phase voltage.

2.02 CLASS RK1 (TIME DELAY) FUSES

- A. Manufacturers:
 - 1. Bussman.
 - 2. Gould Shawmut.
 - 3. Substitutions: General Conditions.
- B. Dimensions and Performance: NEMA FU 1.
- C. Voltage: Rating suitable for circuit phase-to-phase voltage.

TECHNICAL SPECIFICATIONS

2.03 CLASS RK1 (NON-TIME-DELAY) FUSES

- A. Manufacturers:
 - 1. Bussman.
 - 2. Gould Shawmut.
 - 3. Substitutions: General Conditions.
- B. Dimensions and Performance: NEMA FU 1.
- C. Voltage: Rating suitable for circuit phase-to-phase voltage.

2.04 CLASS RK5 FUSES

- A. Manufacturers:
 - 1. Bussman.
 - 2. Gould Shawmut.
 - 3. Substitutions: General Conditions.
- B. Dimensions and Performance: NEMA FU 1.
- C. Voltage: Rating suitable for circuit phase-to-phase voltage.

2.05 CLASS J (TIME DELAY) FUSES

- A. Manufacturers:
 - 1. Bussman
 - 2. Gould Shawmut.
 - 3. Substitutions: General Conditions.
- B. Dimensions and Performance: NEMA FU 1.
- C. Voltage: Rating suitable for circuit phase-to-phase voltage.

2.06 CLASS J (NON-TIME-DELAY) FUSES

- A. Manufacturers:
 - 1. Bussman
 - 2. Gould Shawmut.
 - 3. Substitutions: General Conditions
- B. Dimensions and Performance: NEMA FU 1.
- C. Voltage: Rating suitable for circuit phase-to-phase voltage.

2.07 CLASS L (FAST-ACTING) FUSES

- A. Manufacturers:
 - 1. Bussman
 - 2. Gould Shawmut.

TECHNICAL SPECIFICATIONS

- 3. Substitutions: General Conditions.
- B. Dimensions and Performance: NEMA FU 1.
- C. Voltage: Rating suitable for circuit phase-to-phase voltage.

2.08 CLASS L (TIME DELAY) FUSES

- A. Manufacturers:
 - 1. Bussman
 - 2. Gould Shawmut.
 - 3. Substitutions: General Conditions
- B. Dimensions and Performance: NEMA FU 1.
- C. Voltage: Rating suitable for circuit phase-to-phase voltage.

2.09 SPARE FUSE CABINET

- A. Product Description: Wall-mounted sheet metal cabinet with shelves, suitably sized to store spare fuses and fuse pullers specified.
- B. Doors:Hinged, with hasp for Owner's padlock.
- C. Finish: Gray enamel.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install fuse with label oriented so manufacturer, type, and size are easily read.
- B. Install spare fuse cabinet at location as directed by Owner.

END OF SECTION 16491

TECHNICAL SPECIFICATIONS

SECTION 16510 INTERIOR LIGHTING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes interior luminaires, lamps, ballasts, and accessories.
- B. **LIGHTING AGENCIES, DISTRIBUTORS, ETC. ARE REQUIRED TO HAVE A COMPLETE FIXTURE SCHEDULE, ALL LIGHTING PLANS, ARCHITECTURAL REFLECTED CEILING PLANS AND SPECIFICATIONS IN ORDER TO BID THE PROJECT. PRICING SHALL NOT BE BASED ON CATALOG NUMBERS ALONE. COORDINATE AND PROVIDE ALL MOUNTING HARDWARE AND ACCESSORIES AS REQUIRED BY ARCHITECTURAL CEILING TYPES AND CEILING TILE CONFIGURATIONS. CHANGE ORDERS WILL NOT BE ALLOWED FOR FAILURE TO USE THE COMPLETE SET OF PLANS FOR BID PURPOSES.**
- C. Related Sections:
 - 1. Section 16060 - Grounding and Bonding for Electrical Systems.

1.02 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI C82.1 - American National Standard for Lamp Ballast-Line Frequency Fluorescent Lamp Ballast.
 - 2. ANSI C82.4 - American National Standard for Ballasts-for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type).
 - 3. ANSI_NEMA_ANSLG C78.377-2008 Specifications for the Chromaticity of Solid State Lighting Products.
- B. Illuminating Engineering Society (IES)
 - 1. IES LM-79-08
 - 2. IES LM-80-08
- C. US Department of Energy
 - 1. Lighting Facts

1.03 SUBMITTALS

- A. General Conditions: Submittal procedures.
- B. Shop Drawings: Indicate dimensions and components for each luminaire not standard product of manufacturer.
- C. Product Data: Submit dimensions, ratings, and performance data.
- D. Samples: If requested, submit two color chips 3 x 3 inch (75 x 75 mm) in size illustrating luminaire finish color where indicated in luminaire schedule.

TECHNICAL SPECIFICATIONS

1.04 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years [documented] experience.

1.05 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.06 MAINTENANCE MATERIALS

- A. General Conditions: Spare parts and maintenance products.
- B. Furnish two of each plastic lens type.
- C. Furnish 10% replacement lamps for each type of lamp installed.
- D. Furnish 10% of each type of ballast type.

1.07 SUPPORT AND BRACING

- A. All luminaires shall be installed with supports and bracing required for the seismic zone in which the project is located. See Section 16073.

PART 2 PRODUCTS

2.01 INTERIOR LUMINAIRES

- A. Product Description: Complete interior luminaire assemblies, with features, options, and accessories as scheduled on drawings.
- B. Refer to General Conditions for product options.

2.02 FLUORESCENT BALLASTS

- A. Fluorescent ballasts shall be programmed rapid start, high frequency, energy efficient, electronic type.
- B. Ballasts Approved by E.T.L. and provided with U.L. and C.B.M. labels.
- C. Ballasts factor shall be 0.87 or as noted for Super T8 System.
- D. Ballasts power factor shall be 0.95 or higher.
- E. Interior ballast noise level essentially quiet in normal ambient noise level. (Class A or better)
- F. Ballasts shall not generate more than 20% total harmonic distortion (THD), shall have less than 2% flicker and a power factor of 90% or greater.

TECHNICAL SPECIFICATIONS

- G. Interior ballasts installed to function without interruptions when operating in a room ambient temperature of 50-80 degree F and plenum ambient temperature of 50-120 degree F. Provide low temperature starting (0°F) where specified or required for proper operation.
- H. Acceptable Electronic Fluorescent Ballast Manufacturers
 - 1. Osram Sylvania
 - 2. Philips/Advance
 - 3. Universal Lighting Technologies
 - 4. ACE Ballasts may NOT be used.

2.03 HIGH PERFORMANCE, ENERGY SAVING, T8 LAMP/BALLAST SYSTEM

- A. Lamps shall be Osram Sylvania OCTRON XPS ECOLOGIC (FO17/800XPS/ECO, FO25/800XPS/ECO or FO32/800XPS/ECO) lamp(s) having medium bi-pin bases. Lamp(s) shall pass the existing Federal TCLP limits. Lamp(s) shall have an average rated life of 30,000 hours at 3 hrs per start (36,000 for FO32), a CRI of 85, 95% lumen maintenance at 8000 hours and a correlated color temperature of 4100K. Lamps shall have 1400 initial lumens for FO17, 2200 initial lumens for FO25 and 3100 initial lumens for FO32. Lamp(s) shall be operated on dedicated QUICKTRONIC PROStart PSX universal voltage ballasts with 71 ballast factor and complete system warranty from the manufacturer covering lamps and ballasts.
- B. Limited 36 month lamp warranty and a five year ballast warranty is possible if both lamps and ballasts are provided by OSRAM SYLVANIA. Lamps are operated by occupancy sensor operations are covered under the warranty. See the QUICK 60+ warranty published by OSRAM SYLVANIA for details and restrictions.
- C. Equivalent lamp ballast system acceptable if equivalent performance and warranty is provided.

2.04 RECESSED LUMINAIRES

- A. Furnish all recessed luminaires in compliance with U.L. Standards for:
 - 1. Suspended Ceilings Non-Type I.C.
 - a. Where luminaire is used in a suspended ceiling.
 - 2. Thermally Protected Fixture - Non-Type I.C.
 - a. Where luminaire is installed in a ceiling with the possibility of overheating.
 - 3. DC - IC Luminaire - Type I.C.
 - a. Where luminaire is intended to be installed where direct contact with insulation is expected.
- B. Check Architectural drawings, sections and specifications for insulation methods and ceiling types for additional information to determine the correct method to furnish luminaires for U.L. compliance.

2.05 STEMS

TECHNICAL SPECIFICATIONS

- A. Ball aligned, swivel 30 or 45 degrees from vertical with swivel below canopy. Painted same color as luminaire trim unless otherwise noted.

2.06 LAMPS

- A. Fluorescent - size, length and type shown in Luminaire Schedule on drawings.
- B. Use proper lamp for installed reflector assembly.
- C. Acceptable Lamp Manufacturers
 1. Osram/Sylvania
 2. Philips
 3. G.E. lamps may not be used.
- D. **All lamps shall be installed as new immediately prior to final inspection; do not use for construction purposes.**
- E. It is recommended that fluorescent lamps be "seasoned" before dimming by operating them at full light output, so as to ensure uniform dimming performance across all lamps in a system. Recommendations vary, but NEMA recommends seasoning fluorescent linear lamps overnight, or about 12 hours, and compact fluorescent lamps for 100 hours, prior to dimming. Consult the lamp manufacturer to determine whether the select lamp type must be seasoned and for how long prior to dimming.
- F. Guarantee lamps as follows: Fluorescent and HID lamps, one year. Incandescent lamps, one month. Guarantees begin from date of Substantial Completion.

2.07 EXIT LIGHTS

- A. Exit lights furnished with 6" high stencil letters. Use green LED's. Verify color used with local codes, if a different color is required; indicate on the shop drawing submittal.

PART 3 EXECUTION

3.01 EXISTING WORK

- A. Disconnect and remove abandoned luminaires, lamps, and accessories.
- B. Extend existing interior luminaire installations using materials and methods compatible with existing installations, or as specified.
- C. Clean and repair existing interior luminaires to remain or to be reinstalled.

3.02 INSTALLATION

- A. Support of luminaires responsibility of this Section.

TECHNICAL SPECIFICATIONS

- B. See Spec Section 16073, Seismic Protection for Electrical Equipment for additional requirements.
- C. Fixtures mounted in grid ceilings and in hard ceilings shall be supported independently of the ceiling or ceiling grid. See details on plans. For recessed fixtures in hard ceilings provide one support at each corner of 2' x 4' and larger luminaires and one at each end at opposite corners of 1' x 4' and 2' x 2' luminaires. In hard ceilings, galvanized hanger wires may be used.
- D. Provide devices for securing luminaire to ceiling grid to comply with Article 410-16(c) of National Electrical Code. ("Earthquake Clips").
- E. Wire luminaires with flexible conduit individually to junction boxes. Do not wire luminaire to luminaire.
- F. Anchor high intensity discharge luminaires mounted in ceiling or on wall to structure. Support recessed ceiling luminaires independent of ceiling construction. Supports to consist of 1/4" diameter bolts or rods.
- G. Support recessed luminaires with 3/4" black iron ceiling channel, one piece on each side of luminaire, anchored to ceiling system. Support large recessed luminaires over 20 pounds independent of furred ceiling system with rods, size as required, anchored to structure.
- H. Support surface and pendant luminaires from 3/8" fixture stud in outlet box. Large surface or pendant luminaires (in excess of 20 pounds) with 3/8" rod run through the outlet box to structure and anchored independent of ceiling and conduit systems.
- I. Provide plaster frames for recessed luminaires in plaster and concealed spline ceilings supported independent of ceiling construction with 1/4" rod anchored to structure.
- J. Individual flexible connections to luminaires shall be made with 2#14 and 1#14 (ground) THHN-2 in 3/8" flexible conduit not to exceed 6'. Bond ground wire at each end. Provide additional wire(s) as required for a/b and similar switching schemes.
- K. Stems on linear luminaires shall be installed as follows (except luminaires with slide grip hangers): First and last stem in row shall be installed in first knockout from end of luminaires; one stem shall be installed between each two luminaires connect intermediate stems to center joint where luminaires join and attach by use of "joining plates". Provide adequate number of stems to completely support luminaires and keep luminaires aligned straight and plumb.
- L. Connect luminaires in continuous rows other than recessed grid type connected by nipples with locknuts and bushings.
- M. Furnish complete manufacturers shop drawing for continuous luminaires showing mounting, ceiling interface and complete luminaire layout.
- N. Locate all ceiling luminaires as indicated on Drawings.

TECHNICAL SPECIFICATIONS

- O. Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- P. Install recessed luminaires to permit removal from below.
- Q. Install recessed luminaires where installed in rated assemblies using accessories and firestopping materials to meet regulatory requirements for fire rating.
- R. Install wall-mounted luminaires at height as indicated on Drawings.
- S. Install accessories furnished with each luminaire.
- T. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- U. Install specified lamps in each luminaire.
- V. Ground and bond interior luminaires in accordance with Section 16060.

3.03 FIELD QUALITY CONTROL

- A. General Conditions: Field inspecting, testing, adjusting, and balancing.
- B. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.04 ADJUSTING

- A. General Conditions: Testing, adjusting, and balancing.
- B. Aim and adjust luminaires as indicated on Drawings.

3.05 CLEANING

- A. General Conditions: Final cleaning.
- B. Remove dirt and debris from enclosures.
- C. Clean photometric control surfaces as recommended by manufacturer.
- D. Clean finishes and touch up damage.

3.06 PROTECTION OF FINISHED WORK

- A. General Conditions: Protecting finished work.
- B. Relamp luminaires having failed lamps at Substantial Completion.

3.07 GUARANTEE

- A. All luminaires, components, accessories etc., except lamps, shall be guaranteed against defects in materials and workmanship for one (1) year from date of in-service

TECHNICAL SPECIFICATIONS

acceptance by owner. Replacement shall include parts and labor at the site of the work for the term of the warranty.

- B. Lamps shall be guaranteed as specified above.
- C. Lamp-ballast combination warranties of 5 years shall be included for the Osram Sylvania T8 lamp/ballast system in Paragraph 2.4.

END OF SECTION 16510

TECHNICAL SPECIFICATIONS

SECTION 16520 EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes exterior luminaires, poles, and accessories.

1.02 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI C82.1 - American National Standard for Lamp Ballast-Line Frequency Fluorescent Lamp Ballast.
 - 2. ANSI C82.4 - American National Standard for Ballasts-for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type).
 - 3. ANSI O5.1 - Wood Poles, Specifications and Dimensions.
 - 4. ANSI_NEMA_ANSLG C78.377-2008 Specifications for the Chromaticity of Solid State Lighting Products.
- B. Illuminating Engineering Society (IES)
 - 1. IES LM-79-08
 - 2. IES LM-80-08
- C. U.S. Department of Energy
 - 1. Lighting Facts

1.03 SUBMITTALS

- A. General Conditions: Submittal procedures.
- B. Shop Drawings: Indicate dimensions and components for each luminaire not standard Product of manufacturer.
- C. Product Data: Submit dimensions, ratings, and performance data.
- D. Samples: If requested, submit two color chips 3 x 3 inch (75 x 75 mm) in size illustrating luminaire finish color where indicated in luminaire schedule.

1.04 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years [documented] experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. General Conditions: Product storage and handling requirements.

1.06 COORDINATION

- A. General Conditions: Coordination and project conditions.

TECHNICAL SPECIFICATIONS

- E. Furnish bolt templates and pole mounting accessories to installer of pole foundations.

1.07 MAINTENANCE MATERIALS

- A. General Conditions: Spare parts and maintenance products.

PART 2 PRODUCTS

2.01 LUMINAIRES

- A. Product Description: Complete exterior luminaire assemblies, with features, options, and accessories as scheduled.
- B. Refer to General Conditions for product options.

2.02 LED LUMINAIRES

- A. Shall be tested according to the Illuminating Engineering Society of North America (IESNA) LM-79 and LM-80.
 - 1. Shall supply third party testing and data in compliance with Commercially Available LED Product Evaluation and Reporting (CALiPER) or National Voluntary Laboratory Accreditation Program (NVLAP).
 - 2. The testing laboratory must be listed on the U.S. Department of Energy's Solid-State Lighting website as an accredited testing laboratory.
 - 3. Manufacturers shall provide supporting evidence of lamp life calculation based on junction temperature and drive current upon request.
- B. Shall be listed and labeled in accordance with the U.S. Department of Energy Lighting Facts Program.
- C. Shall provide independent test laboratories IES photometrics which verify light levels.
- D. Correlated Color Temperature (CCT) measured in Kelvin's shall meet Nominal CCTs and tolerances as defined in ANSI_NEMA_ANSLF C78.377-2008.
 - 1. Nominal CCT 5000 K: 5028 ± 283 K
- E. Minimum CRI greater than 80.

PART 3 EXECUTION

3.01 EXAMINATION

- A. General Conditions: Coordination and Project conditions.
- B. Verify foundations are ready to receive fixtures.

TECHNICAL SPECIFICATIONS

3.02 EXISTING WORK

- A. Disconnect and remove abandoned exterior luminaries.

3.03 INSTALLATION

- A. Install concrete bases for lighting poles at locations as indicated on Drawings, in accordance with Section 03300.
- B. Install poles plumb. Install shims to adjust plumb. Grout around each base.
- C. Install lamps in each luminaire.
- D. Bond and ground luminaries, metal accessories and metal poles in accordance with Section 16060.

3.04 FIELD QUALITY CONTROL

- A. General Conditions: Field inspecting, testing, adjusting, and balancing.
- B. Operate each luminaire after installation and connection. Inspect for improper connections and operation.
- C. Measure illumination levels to verify conformance with performance requirements.
- D. Take measurements during night sky, without moon or with heavy overcast clouds effectively obscuring moon.

3.05 ADJUSTING

- A. General Conditions: Testing, adjusting, and balancing.
- B. Aim and adjust luminaries to provide illumination levels and distribution.

3.06 CLEANING

- A. General Conditions: Final cleaning.
- B. Clean photometric control surfaces as recommended by manufacturer.
- C. Clean finishes and touch up damage.

3.07 PROTECTION OF FINISHED WORK

- A. General Conditions: Protecting finished work.
- B. Relamp luminaries having failed lamps at Substantial Completion.

END OF SECTION 16520

TECHNICAL SPECIFICATIONS

SECTION 16950 ELECTRICAL SYSTEMS TESTING

PART 1 GENERAL

- A. The Contractor shall retain the services of an independent testing firm certified to perform International Electrical Testing Association (NETA) testing. Testing services shall be as described in this specification and shall be paid for and coordinated by the Contractor.
- B. NETA testing procedures and requirements for tested values shall be in accordance with the most current edition of the NETA Acceptance Testing Specifications.
- C. Any deficiencies or failures discovered during the NETA testing procedures shall be promptly corrected by the Contractor to ensure timely completion of the project and to minimize the time required for the independent testing firm to complete their work.
- D. Independent NETA testing firms shall be as listed below, or approved equal.
 - 1. Electrical Reliability Services Northern Nevada Office (775) 746-4466
 - 2. Electrical Reliability Services Southern Nevada Office (702) 597-0020
 - 3. Southwest ElectriTech Services Southern Nevada Office (702) 685-5510

1.01 TEST REPORTS

- A. Intermediate Test Reports
 - 1. Intermediate test reports shall be issued by the independent testing firm immediately following each site visit. Intermediate test reports shall identify the general results of all field testing and field observations, and shall specifically identify any deficiencies, problems, or failures noted during the site visit.
 - 2. Intermediate test reports shall be issued/distributed to the electrical subcontractor, the general contractor, the electrical engineer, and to the Owner. The intent of this direct communication and/or notification to multiple parties is to ensure the 'independent' function of the independent testing firm and to prevent such information from being delayed or filtered by processing it through the electrical subcontractor and/or the general contractor.
- B. Final Test Report
 - 1. Six copies of the final test report shall be issued by the independent testing firm following successful completion all required electrical systems testing. The final test report shall be typed, bound, and indexed, and shall include a cover page that identifies the project name, project location, and project number. The final test report shall include a separate section for each area of required testing (tests as summarized below).
 - a. Grounding Systems
 - b. Circuit Breakers (Over 100 Amps)

TECHNICAL SPECIFICATIONS

- c. Low Voltage Feeders (up to 600 Volts) Serving Loads of 100 Amps or Greater

1.02 TESTING REQUIREMENTS

A. Grounding Systems

1. The following grounding system testing shall be conducted on two separate occasions, once prior to initializing electrical power for construction activities, and once when all electrical systems have been finalized.
2. Perform fall-of-potential testing of the main grounding electrode or grounding system in accordance with IEEE Standard No. 81. If suitable locations for test rods are not available, a low resistance dead earth or reference ground shall be utilized.
3. Perform point-to-point testing to determine the resistance (bonding) between the main grounding system and all major electrical equipment frames, system neutral, and/or derived neutral points.
4. Measure system neutral-to-ground insulation resistance with the neutral disconnect link temporarily removed (replace neutral disconnect link after testing).
5. This testing shall be performed at the origination point of all separately derived systems.

B. Circuit Breakers (Over 100 Amps)

1. Test requirements apply to adjustable molded case, insulated case, and metal frame circuit breakers.
2. Measure contact resistance by millivolt drop method at rated current or by digital low resistance ohmmeter method.
3. Test insulation resistance from pole-to-pole and from pole-to-ground with breaker closed and across open contacts of each phase.
4. Adjust trip settings in accordance with coordination study.
5. Measure instantaneous pickup current by primary current injection.
6. Measure long-time pickup and delay by primary current injection.
7. Measure short-time pickup and delay by primary current injection.
8. Verify trip unit reset operation.

C. Low Voltage Feeders (up to 600 Volts) Serving Loads of 100 Amps or Greater

1. Conduct megohm (Megger) testing of shield continuity resistance utilizing a megohmmeter.
2. Test insulation resistance phase-to-ground and phase-to-phase for one minute.
3. Test voltages shall be as recommended by the feeder manufacturer (or by NETA Acceptance Testing Specification).

END OF SECTION 16950

TECHNICAL SPECIFICATIONS

SECTION 17010 BASIC COMMUNICATION REQUIREMENTS

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. Drawings and general provisions of the Contract, Including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.
- B. Include all labor, materials, tools, transportation, storage costs, excavation, training, equipment, insurance, temporary protection, permits, inspections, taxes and all necessary and related items required to provide a complete and operational telecommunications system as shown on the Drawings and described in the Specifications.

1.02 QUALITY ASSURANCE

- A. The Contractor installing communications cabling and termination equipment must have a minimum of (5) years experience installing telecommunications systems of similar size and scope.
- B. The Contractor must be licensed by the Nevada State Contractors Board.
- C. Formal, written evidence of the following may be requested at any point during the Bid or installation processes:
 - 1. The Contractor, including any subcontractor, must have BICSI® Registered Installers and Technicians on staff and assign them to the current Project. The project shall be staffed at all times by Installers and Technicians who, in the role of lead crafts persons, shall be able to provide leadership and technical resources for the remaining crafts persons on the project.
 - 2. If requested, the Contractor, including any subcontractor, shall show proven expertise in the implementation of cabling projects. This expertise can be illustrated through the inclusion of details of at least three projects involving the design and installation of Category 6 unshielded twisted-pair cabling systems and optical fiber cabling systems within the past two year period. Names, addresses, and telephone numbers of references for the three projects shall be included.
 - 3. The Contractor must be certified by Belden/CDT, CommScope or approved equal in order to provide a 20 to 25 system warranty for the horizontal Category 6 cabling. The Contractor shall perform all necessary training from the manufacturer to obtain the manufacturer certification.

TECHNICAL SPECIFICATIONS

4. In the event subcontractors are used for any portion of the installation or acceptance testing, the Contractor shall be responsible for any subsequent corrective action required on that portion of the work.

1.03 SUBMITTALS

A. Manufacturer's Data Sheets

1. Submit minimum 6 copies. Architect/Engineer will retain a minimum of 3 copies and return balance to Contractor.
2. Data sheets must be bound in 3-ring binders. Provide a table of contents for each binder indicating the products submitted. Products listed in the table of contents should be in the same order as they appear in the Specifications.
3. Where pre-printed data covers more than one distinct item, mark data sheet to clearly indicate which item is to be provided. Delete or cross-out non-applicable data.

B. Shop Drawings

1. Submit (1) reproducible and (3) blue lines. Architect/Engineer will retain a minimum of 3 copies and will return the reproducible to the Contractor.
2. Submit shop drawings for conduit routing and telecom room layouts to Consultant for review within 90 days after award of contract. Carefully examine shop drawings to insure compliance with drawings and specifications prior to submittal to Consultant. Shop drawings and submittals shall bear the stamp of approval of the Telecom Contractor as evidence that they have checked the drawings. Drawings submitted without this stamp of approval will not be considered and will be returned for proper resubmission. All shop drawings shall be submitted as a single one time complete package. Partial packages will not be reviewed.

C. Test Reports

1. Submit test reports signed and dated by the firm performing the cable testing.

D. Other Submittals

1. See individual Specification Sections for requirements.

E. Substitutions

1. No material substitutions will be allowed except by written acceptance from the Consultant. Specified catalog numbers are used for description of equipment and standard of quality only. Equivalent material will be

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given consideration only if adequate comparison data including samples are provided.

1.04 REGULATIONS AND CODE COMPLIANCE

- A. The Contractor will comply with all applicable governmental regulations including Federal, State, City, and local applicable codes and ordinances.
- B. References to codes and standards called for in the Specifications refer to the latest edition, amendments, and revisions to the codes and standards in effect on the date of these Specifications.
- C. All work and materials shall conform to and be installed, inspected and tested in accordance with the governing rules and regulations of the telecommunications industry, as well as federal, state and local governmental agencies, including, but not limited to the following
 1. ANSI/TIA-568-C.0 – Generic Telecommunications Cabling for Customer Premises.
 2. ANSI/TIA-568-C.1 – Commercial Building Telecommunications Cabling Standard.
 3. ANSI/TIA-568-C.2 – Balanced Twisted-Pair Telecommunication Cabling and Components Standard.
 4. ANSI/TIA-568-C.3 – Optical Fiber Cabling Components Standard.
 5. ANSI/TIA-569-B – Commercial Building Standard for Telecommunications Pathways and Spaces.
 6. ANSI/TIA-606-A -- The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
 7. ANSI-J-STD-607-A -- Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
 8. ANSI/TIA-758-A -- Customer-Owned Outside Plant Telecommunications Infrastructure Standard.
 9. ANSI/NFPA-70, 2005 -- National Electrical Code (NEC).
 10. Underwriter's Laboratories, Inc. (UL).
 11. Federal Communications Commission (FCC).
 12. Americans with Disabilities Act (ADA).

1.05 DEFINITIONS

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A.	Approved/Approval	Written permission to use a material or system.
B.	As Called For	Materials, equipment including the execution specified/shown in the Specifications.
C.	Code Requirements	Minimum requirements.
D.	Concealed	Work installed in pipe and duct shafts, chases or recesses, inside walls, above ceilings, in slabs or below grade.
E.	Exposed	Work not identified as concealed.
F.	Final Acceptance	Owner acceptance of the project from the Contractor upon certification by the Owner's Representative.
G.	Furnish	Supply and deliver to installation location.
H.	Furnished by Others	Receive delivery at job site or where called for and install.
I.	Inspection	Visual observations by Owner or Owner's Representative.
J.	Install	Mount and connect equipment and associated materials ready for use.
K.	Listed	Refers to classification by a standards agency.
L.	Or Approved Equal	Approved equal or equivalent as determined by Owner or Owner's Representative.
M.	Owner's Representative	Design professional or Consultant representing the Owner.
N.	Provide	Furnish, install and connect ready for use.
O.	Relocate	Disassemble, disconnect, and transport equipment to new locations: then clean, test, and install ready for use.
P.	Replace	Remove and provide new item.
Q.	Review	A general contractual conformance check of specified products.
R.	Satisfactory	As specified in Specifications.

1.06 INTENT OF DRAWINGS

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- A. All drawings are diagrammatic unless otherwise noted as detailed dimensioned drawings. Drawings show approximate locations of equipment and devices. Exact locations are subject to the approval of the Owner or Owner's Representative. The Contractor shall verify dimensions and shall be responsible for their accuracy
- B. Items mentioned in the Specifications and not shown in the Drawings, or shown in the Drawings and not mentioned in the Specifications, shall be of like effect as if shown and mentioned in both. In the case of differences between the Drawings and the Specifications, the stricter provision as determined by the Owner or Owner's Representative shall govern.
- C. Omissions from the Drawings or Specifications, or the incorrect description of details of Work which are necessary to carry out the intent of the Drawings and Specifications, or work which is customarily performed, shall not relieve the Contractor from performing such omitted or incorrectly described work.
- D. No exclusion from, or limitations in, the language used in the Project Documents shall be interpreted as meaning that ancillary or accessory items necessary to complete any required system or item of equipment are to be omitted.

1.07 REVIEW OF SPECIFICATIONS

- A. The Contractor shall carefully study and compare the Drawings and Specifications and shall at once report to the Owner or Owner's Representative any error, inconsistency or omission discovered. If the Contractor performs any construction activity knowing it involves a recognized error, inconsistency or omission in the Specifications without such notice to the Owner or Owner's Representative, the Contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of the cost for any correction.

1.08 EXAMINATION OF THE PREMISES

- A. The Contractor shall visit the Site to become familiar with the local conditions under which the work is to be performed and correlate his observations with the requirements of the Drawings and Specifications. No allowance will be made for claims of concealed conditions which the Contractor learned or should have learned in exercising due diligence in its observations of the site and review of the local conditions.
- B. Before ordering any materials or performing any work, the Contractor shall verify all measurements and be responsible for correctness of same. No extra charge or compensation will be allowed for duplicate work or material required because of an unverified difference between an actual dimension and the measurement indicated in the Drawings. Any discrepancies found shall be submitted in writing to the Owner or Owner's Representative for consideration before proceeding with the work.

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1.09 WARRANTY AND SERVICES

- A. The horizontal Category 6 voice and data cabling system including cabling, patch panels, jacks and faceplates shall carry a minimum 20-year manufacturer warranty from Belden/CDT, CommScope Systimax or approved equal.
- B. The premise and outside plant fiber optic cabling system including fiber optic cabling, termination cabinets and fiber connectors shall carry a minimum 25-year manufacturer warranty from Corning LANscape, AFL Telecommunications or approved equal.

PART 2 PRODUCTS

2.01 EQUIPMENT AND MATERIALS MINIMUM REQUIREMENTS

- A. Electrical equipment and systems shall meet UL Standards and requirements of the National Electric Code. This listing requirement applies to the entire assembly. Any modifications to equipment to suit the intent of the Specifications shall be performed in accordance with these requirements.
- B. Equipment shall meet all applicable FCC Regulations.
- C. All materials, unless otherwise specified, shall be new and be the standard products of the manufacturer. Used equipment or damaged material will be rejected.
- D. The listing of a manufacturer as “acceptable” does not indicate acceptance of a standard or cataloged item of equipment. All equipment and systems must conform to the Specifications.

2.02 WORKMANSHIP, SUBSTITUTIONS, WARRANTY

- A. Materials and workmanship shall meet or exceed industry standards and be fully guaranteed for a minimum of one (1) year from the date of final acceptance. Cable integrity and associated terminations shall be thoroughly inspected, fully tested and guaranteed free from defects, transpositions, open shorts, tight kinks, damaged jacket insulation, etc.
- B. Refer to the individual Division 17 Specifications for additional and/or extended warranty requirements.
- C. All labor must be thoroughly competent, skilled and trained, and all work shall be executed in strict accordance with the best practice of the trades.
- D. The Contractor shall be responsible for and make good, without expense to the Owner, any and all defects arising during this warranty period that are due to imperfect materials, improper installation or poor workmanship.

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- E. After the Contract is awarded, requests to substitute for specified materials shall be submitted by the Contractor to the Owner or Owner's Representative within thirty (30) days, complete with reasons for the substitution and savings which accrue to the Owner if the substitutions are approved. Substitutions after Contract award will be considered only if the substitutions are equal or superior to the products specified.
- F. No material substitutions will be allowed except by written acceptance from the Consultant. Specified catalog numbers are used for description of equipment and standard of quality only. Equivalent material will be given consideration only if adequate comparison data including samples are provided.
- G. Approval of alternate or substitute equipment or material in no way voids the Specification requirements.
- H. Under no circumstances shall the Owner be required to prove that an item proposed for substitution is not equal to the specified item. It shall be mandatory that the Contractor submit to the Owner or Owner's Representative all evidence to support the contention that the item proposed for substitution is equal to the specified item. The Owner's decision as to the equality of substitution shall be final and without further recourse.

2.03 FACTORY ASSEMBLED PRODUCTS

- A. Manufacturers of equipment assemblies that include components made by others shall assume complete responsibility for the final assembled unit.
 - 1. All components of an assembled unit need not be products of the same manufacturer.
 - 2. Component parts, which are alike, shall be from a single manufacturer.
 - 3. Components shall be compatible with each other and with the total assembly for the intended service.
 - 4. Components of equipment shall bear the manufacturer's name or trademark model number and serial number on a name plate securely affixed in a conspicuous place, or cast integral with, stamped or otherwise permanently marked upon the components of the equipment.
- B. Major items of equipment that serve the same function must be the same make and model.
- C. Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that a complete and fully operational system will result.
- D. Maximum standardization of components shall be provided to reduce spare part requirements.

TECHNICAL SPECIFICATIONS

PART 3 EXECUTION

3.01 ROUGH-IN

- A. Before construction work commences, the Contractor shall visit the site and identify the exact routing of horizontal and backbone pathways.
- B. All equipment locations shall be coordinated with other trades and existing conditions to eliminate interference with required clearances for equipment maintenance and inspections.
- C. Coordinate work with other trades and existing conditions to determine exact routing of all raceways and locations of sleeves.
 - 1. Where more than one trade is involved in an area, space or chase, all shall cooperate and install their own work to utilize the space equally between them in proportion to their individual requirements. If, after installation of any equipment, piping, ducts, conduit, and boxes, it is determined that adequate space has not been provided for passage or maintenance, rearrange work. Any changes in the size or location of the material or equipment supplied or proposed, which may be necessary in order to meet field conditions or in order to avoid conflicts between trades, shall be brought to the immediate attention of the Owner's Representative and approval received before such alterations are made.
- D. Provide easy, safe and code mandated clearances at equipment racks and enclosures.

3.02 CUTTING AND PATCHING

- A. The Contractor shall be responsible for all cutting, patching, coring and associated work to complete the telecommunications cabling system. Patch adjacent work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering or other finished surfaces.

3.03 FIRESTOPPING

- A. All penetrations through fire-rated building structures (walls and floors) shall be sealed with an appropriate fire stop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating item i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall be properly fire stopped.
- B. Fire stopping References:
 - 1. ASTM E814, Standard Method of Fire Tests of Through-Penetration Fire Stops.

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2. ASTM E 119, Fire Tests of Building Construction and Materials (for fire-rated architectural barriers).
3. 2002 NFPA National Electrical Code, Section 800-52, Paragraph 2(b), Spread of Fire and Products of Combustion.

3.04 CONCEALMENT

- A. Horizontal and backbone raceway and cabling shall be concealed above ceilings, in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, or in areas without ceilings, the Owner's Representative shall be notified of the proposed routing prior to starting that portion of the work.

3.05 WATERPROOFING

- A. The Contractor shall seal all foundation penetrating conduits and all service entrance conduits and sleeves to eliminate the intrusion of moisture, gases and rodents into the building. This requirement also applies to spare conduits.
- B. Spare conduits shall be plugged with expandable plugs.
- C. All service entrance conduits shall be sealed or resealed after cable placement.

3.06 GENERAL INSTALLATION REQUIREMENTS

- A. Coordinate ordering and installation of all equipment with long lead times or having a major impact on work by other trades so as not to delay the job or impact the schedule.
- B. Where mounting heights are not dimensioned, install systems, materials and equipment to provide the maximum headroom possible.
- C. Set all equipment to accurate line and grade, level all equipment and align all equipment components.
- D. Provide all scaffolding, rigging, hoisting and services necessary for erection and delivery of equipment and apparatus furnished into the premises.
- E. No equipment shall be hidden or covered up prior to inspection by the Owner's Representative. All work that is determined to be unsatisfactory shall be corrected immediately.
- F. All work shall be installed level and plumb, parallel and perpendicular to other building systems and components.
- G. The Contractor shall replace all ceiling tiles damaged by work performed as part of the telecommunications contract.

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- H. Storage and security of material and equipment shall be the responsibility of the Contractor.

END OF SECTION 17010

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SECTION 17110 COMMUNICATION EQUIPMENT ROOMS

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. Drawings and general provisions of the Contract, Including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.
- B. The Contractor shall provide all equipment, materials, labor, and services necessary to complete communication equipment rooms and spaces, and to ensure that they are in compliance with requirements stated or reasonably inferred by the Specifications and the Contract Drawings.
- C. Minimum requirements and installation methods are included for the following:
 - 1. 2-Post Equipment Racks (45 RU)
 - 2. Concrete Expansion Anchors
 - 3. Plywood Backboards
 - 4. Horizontal Cable Managers
 - 5. Vertical Cable Managers for Floor Standing Racks
 - 6. Category 6 Copper Patch Panels
 - 7. 48-Port Fiber Optic Termination Cabinets
 - 8. Wall Mounted "Re-closeable" Fiber Optic Cable Storage Rings
 - 9. Grounding Bars and Ground Conductors
 - 10. Category 6 Copper Patch Cords
 - 11. Singlemode Fiber Optic Patch Cords
 - 12. 120V Rack Mounted Uninterruptible Power Supplies
 - 13. IP Management Modules for Uninterruptible Power Supplies

1.02 REGULATIONS AND CODE COMPLIANCE

- A. Materials and work specified herein shall comply with the requirements of Specification Section 17010 1.4 and in particular the following code requirements
 - 1. ANSI/TIA-568-C.0 – Generic Telecommunications Cabling for Customer Premises.
 - 2. ANSI/TIA-568-C.1 – Commercial Building Telecommunications Cabling Standard.
 - 3. ANSI/TIA-568-C.2 – Balanced Twisted-Pair Telecommunication Cabling and Components Standard.
 - 4. ANSI/TIA-568-C.3 – Optical Fiber Cabling Components Standard.
 - 5. ANSI/TIA-569-B – Commercial Building Standard for Telecommunications Pathways and Spaces.
 - 6. ANSI/TIA-606-A -- The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.

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7. ANSI-J-STD-607-A -- Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
8. ANSI/TIA-758-A -- Customer-Owned Outside Plant Telecommunications Infrastructure Standard.
9. ANSI/NFPA-70, 2005 -- National Electrical Code (NEC).
10. Underwriter's Laboratories, Inc. (UL).
11. Federal Communications Commission (FCC).
12. Americans with Disabilities Act (ADA).

1.03 QUALITY ASSURANCE

- A. All cable, raceways and equipment in the telecom rooms shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the Specifications shall be subject to the control and approval of the Owner's Representative.

1.04 SUBMITTALS

- A. Manufacturer's Data Sheets: Submit manufacturer's data sheets for the following items:
 1. 2-Post Equipment Racks (45 RU)
 2. Concrete Expansion Anchors
 3. Plywood Backboards
 4. Horizontal Cable Managers
 5. Vertical Cable Managers for Floor Standing Racks
 6. Category 6 Copper Patch Panels
 7. 48-Port Fiber Optic Termination Cabinets
 8. Wall Mounted "Re-closeable" Fiber Optic Cable Storage Rings
 9. Grounding Bars and Ground Conductors
 10. Category 6 Copper Patch Cords
 11. Singlemode Fiber Optic Patch Cords
 12. 120V Rack Mounted Uninterruptible Power Supplies
 13. IP Management Modules for Uninterruptible Power Supplies
- B. Bill of Materials: Submit a detailed bill-of-materials listing all manufacturers, part numbers, and quantities proposed for use on this project.
- C. Shop Drawings: Submit shop drawings indicating the proposed layout of equipment in the telecommunication rooms.

1.05 DELIVERY, STORAGE & HANDLING

- A. protect all wiring blocks, patch panels, jacks and patch cords from moisture, dust and debris prior to installation.
- B. Install equipment in the telecom rooms only after the room construction is complete and the room clean. This includes all gypboard walls, gypboard ceilings, floor finishes, t-bar grid, plywood backboards, door frames, doors and

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paint. Notify the Owner's Representative of any incomplete items prior to installing equipment.

1.06 GUARANTEE

- A. See Specification Section 17010 for warranty requirements which apply to the patch panels and cabling specified in this section.

PART 2 PRODUCTS

2.01 ENCLOSED FLOOR STANDING EQUIPMENT CABINETS (45 RU)

- A. Provide enclosed equipment cabinets in the telecom room where shown on the drawings. Enclosed cabinets shall meet the following physical specifications:
 - 1. Approx 84" high by 32" wide by 42" deep.
 - 2. Cabinets and mounting rails shall have black powder coat finish.
 - 3. Perforated lockable front and rear doors.
 - 4. Solid side panels.
 - 5. Solid or perforated top panel with openings w/grommets for cabling.
 - 6. 2 sets (front and rear) square punched equipment mounting rails.
 - 7. 2 sets (front and rear) vertical cable managers.
 - 8. Provide 50 cage nuts and screws for equipment mounting.
- B. Acceptable Products:
 - 1. Chatsworth Teraframe "F" Series Cabinet [CPI P/N's FF3N-113B-C22-B (Cabinet), 35095-C05 (Vertical Cable Managers), 34537-000 (Blank Filler Panel), 12639-001-C52 (25-Pack Cage nuts – provide qty 2)].
 - 2. Or approved equal by Great Lakes.

2.02 PLYWOOD BACKBOARDS

- A. Provide 4'-0" x 8'-0" x 3/4" AC void free plywood. Paint plywood with 2 coats of white fire retardant paint. Plywood shall be secured to the wall with sufficient anchors to support 1,500 lbs of equipment weight.

2.03 HORIZONTAL CABLE MANAGEMENT

- A. Horizontal and vertical cable managers shall be provided from the same manufacturer and shall be compatible with the specified cabinets.
- B. Horizontal cable managers shall be 2 rack units in height and have hinged front covers. Hinges shall allow covers to be pivoted in 2 directions. See rack elevations for quantity.
- C. All components shall be color black.
 - 1. Acceptable Products:
 - a. Chatsworth p/n 30130-719.

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b. Or approved equal by Great Lakes

2.04 CATEGORY 6 COPPER PATCH PANELS

- A. Provide 19" rack mounted 48-port or 24-port Category 6 data patch panels as shown on the drawings.
- B. Patch panels shall be constructed of black anodized aluminum or black powder coated steel.
- C. Patch panels shall have fixed outlet jacks with 110 IDC connectors on the rear of the panel.
- D. Patch panels shall be wired in accordance with the T568B standard.
- E. The same manufacturer will be used for both the patch panels and workstation outlets throughout the Project.
- F. Patch panels shall conform to the performance requirements of ANSI/TIA/EIA-568-B.2 Addendum 1 as shown below.

Parameter	Worst Case Channel Performance at 100MHz
Specified Frequency Range	1-250 MHz
Attenuation	0.2 dB
NEXT	54.0 dB
Return Loss	24.0 dB

- G. Acceptable Products:
 - 1. Belden CDT GigaFlex PS6+ Category 6 Patch Panel. Belden/CDT AX101613 (48-port) or AX101611 (24-port).
 - 2. CommScope Uniprise P/N UNP610-24P (24-port) or UNP610-48P (48-port).
 - 3. Or Approved Equal by Leviton.

2.05 RACK MOUNTED OPTICAL FIBER TERMINATION CABINETS & MODULAR CASSETTES

- A. Provide 19" rack mounted optical fiber termination cabinets. See rack elevations for quantity, size and port density of panels.
- B. Provide fiber termination cabinets with the following physical characteristics:
 - 1. 1RU (accepts 2 cassettes), 2RU (accepts 4 cassettes) and 4RU (accepts 12 cassettes) in size.
 - 2. Black smoked Plexiglas front cover.
 - 3. Integral cable strain relief clamps.

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4. Panels shall accept factory manufactured modular pigtail cassettes with duplex LC connectors. Fusion splicing will occur within splice trays integral to the fiber cassettes. The fiber cassettes will then snap into the termination cabinets.

C. Acceptable Products

1. Corning Cable Systems Closet Connector Housing P/N CCH-01U (1RU 48-fiber total), P/N CCH-02U (2RU 96-fiber total) and P/N CCH-04U (4RU 288-fiber total).
2. Or equal.

- ## D. Provide quantity of duplex LC singlemode and multimode factory pre-terminated pigtail splice cassettes to terminate all backbone fiber optic cabling as shown on the drawings. Provide blank adapter panels over unused ports in fiber termination cabinets. Modular cassettes shall have factory installed LC connectors with fiber pigtails. Connectors and pigtails shall match the type of backbone fiber being terminated.

1. Acceptable Products:

- a. 12-Strand (OS2) Single Mode Fiber Pre-terminated Pigtail Cassettes:

- (1) Corning Cable Systems P/N CCH-CS12-A9-P00RE.
- (2) Or equal.

- b. 12-Strand (OM3) Multimode Fiber Pre-terminated Pigtail Cassettes:

- (1) Corning Cable Systems P/N CCH-CS12-E4-P00TE.
- (2) Or equal.

- c. 24-Strand (OS2) Single Mode Fiber Pre-terminated Pigtail Cassettes:

- (1) Corning Cable Systems P/N CCH-CS24-A9-P00RE (provide additional heat-shrink fusion splice protectors as required P/N 2806031-01).

- d. 24-Strand (OM3) Multimode Fiber Pre-terminated Pigtail Cassettes:

- (1) Corning Cable Systems P/N CCH-CS24-E4-P00TE (provide additional heat-shrink fusion splice protectors as required P/N 2806031-01).
- (2) Or equal.

2.06 WALL MOUNTED "RE-CLOSEABLE" STORAGE RINGS FOR FIBER OPTIC CABLING

- A. Provide wall mounted re-closeable storage rings for fiber optic backbone cabling.
- B. Install quantity of storage rings to accommodate all backbone fiber optic cabling.
- C. Storage rings shall be 24 inches in diameter with recloseable Velcro loops.

1. Acceptable Products:

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2.
 - a. Leviton P/N 48900-FR.
 - b. Or Approved Equal.

2.07 VELCRO CABLE TIES

- A. Provide Velcro cable ties cut to length from a continuous roll to loosely bundle horizontal cabling in the telecom rooms routed on the ladder rack to the patch panels. Install Velcro cable ties at 1'-0" intervals.
- B. Do not exceed qty (50) cables per bundle.
- C. Do not attach cable bundles to the runway with the Velcro cable ties. Do not use plastic tie-wraps.
- D. Acceptable Products
 1. Panduit HLS-15R6.
 2. Leviton 43115-075.
 3. Or equal.

2.08 GROUNDING BARS

- A. The entire telecom grounding system including grounding bars, grounding conductors, lugs, etc shall be installed in accordance with ANSI-J-STD-607 A "Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications".
 - B. Provide UL listed copper grounding bars with insulated standoffs and stainless steel mounting brackets. Provide the size and quantity of grounding bars as shown on the drawings.
 - C. Telecommunications grounding bus bars (TGB) located in the telecom rooms shall be copper 12" x 2" x ¼" UON on the Drawings.
 - D. The telecommunications main grounding bus bar (TMGB) located in the Equipment Room shall be copper 20" x 4" x ¼" UON on the Drawings.
 - E. Grounding bars shall have BICSI patterned pre-drilled lug mounting holes to accommodate two hole lug attachment. 5/16" hole sets shall be spaced on 5/8" centers. 7/16" hole sets shall be spaced on 1" centers.
4. Acceptable Products
 - a. Chatsworth 13622-012 (2" high), 40153-020 (4" high).
 - b. Erico TGB-A20L12PT (2" high), TMGB-A20L27PT (4" high).
 - c. Harger GBI14220TGB (2" high), GBI14420TMGB (4" high).
 - d. Or equal.

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- F. Provide separate green insulated #6 AWG grounding conductors from equipment racks, cabinets, metallic backboards, cable sheaths, metallic strength members, ladder rack, conduits, splice cases and building entrance terminals to the grounding bar in each telecom room. Do not “daisy chain” ground conductors.
- G. Grounding bars (TGB's) located in the telecom rooms shall be bonded to the grounding bar (TMGB) located in the Equipment Room with a telecom bonding backbone (TBB) conductor. The TBB shall be continuous without splices. The minimum TBB conductor size shall be a #6 AWG and should be sized at 2 kcmil per linear foot of conductor length up to a maximum of 3/0 AWG.
- H. Provide an insulated grounding conductor (#4 AWG minimum) from the ground bar in each room to building steel. The grounding conductor shall be cad welded to the building steel. See grounding riser detail for conductor sizes and additional grounding requirements.
- I. Provide an insulated grounding conductor (#4 AWG minimum) from the ground bar in each telecom room to an approved electrical ground (electrical panel ground serving the telecom room). See grounding riser detail for conductor sizes and additional grounding requirements.
- J. Ground wires shall have solderless, copper, two bolt, two hole long barrel compression lugs placed on both ends. The two bolt lug holes shall be ¼” and on ¾” centers.
- K. All grounding conductors shall be green in color. All cables and bus bars shall be identified and labeled in accordance with the recommendations made in ANSI/TIA/EIA-606-A.

2.09 CATEGORY 6 COPPER PATCH CORDS

- A. The patch cords must meet the specific manufacturer system warranty requirements listed in Specification Section 17160 1.6.
- B. Provide Category 6 UTP patch cords for interconnection of owner furnished switches and patch panels in all IDF's and the MDF.
- C. Provide one (1) patch cord for each data drop.
- D. Provide patch cords of adequate length to avoid excessive slack or tightness in the cable managers. Patch cords shall be a minimum of 4'-0” and a maximum of 15'-0” in length.
- E. Patch cords should be white, made from stranded conductors and have 8-position RJ-45 style plugs on each end. Patch cords shall be snagless with molded strain relief boots.
- F. Cabling used for patch cords shall be manufactured by the same manufacturer as the horizontal cabling and shall be of the same product line. Cable shall

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conform to the requirements of ANSI/TIA/EIA–568-B.2 Addendum 1. Electrical characteristics and performance of the patch cables shall be nearly identical to the horizontal cable with exceptions given due to differences between solid and stranded conductors as indicated in the following table.

Frequency (MHz)	Stranded Conductor Cable Insertion Loss (dB)
1	2.4
4	4.5
8	6.4
10	7.1
16	9.1
20	10.2
25	11.4
31.25	12.8
62.5	18.5
100	23.8
200	34.8
250	39.4

- G. Patch cords shall be rated for use as communications cable and shall have the designation “CM” or “CMR” printed on the jacket.
- H. Workstation cords and patch cords shall be identical in construction. See Specification Section 17160 for workstation cord requirements.
- I. Acceptable Products:
 - 1. Belden/CDT GigaFlex PS6+ Modular Cord P/N AX350044 (4 ft), AX350045 (7 ft), AX350046 (10 ft), AX350047 (15 ft).
 - 2. CommScope Uniprise UNC6 P/N UNC6-WH-4F (4 ft), UNC6-WH-7F (7 ft), UNC6-WH-10F (10 ft), UNC6-WH-15F (15 ft).
 - 3. Or Approved Equal by Berktek.

2.10 SINGLEMODE FIBER OPTIC PATCH CORDS

- A. Provide duplex LC singlemode fiber optic patch cords for interconnection of owner furnished switches and fiber backbone cabling. Polarization of fiber optic patch cords shall comply with ANSI/TIA/EIA – 568-B.1 Section 10.3.3.
- B. Provide fiber optic patch cords of adequate length to avoid excessive slack and tightness in the cable managers. Provide minimum 2-meter and maximum 5-meter fiber patch cords.
- C. Provide qty (4) fiber patch cords for every owner furnished POE switch. (2) patch cords will be installed at the POE switch and (2) patch cords will be installed at

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the core fiber switch. See Rack Schedule for quantity of owner furnished POE switches.

- D. Provide qty (2) additional fiber patch cords for each POE switch located in a building served by an intermediate fiber cross-connect (IA, IC, ID, E, T1, T2, T4, T5, CT, UI, U3, U4, U5, U6, L, A). See fiber single line diagram to determine buildings served by an intermediate fiber cross connect.
- E. Fiber optic cabling shall comply with the requirements of ANSI/TIA/EIA-568-B.3 and ANSI/TIA/EIA-568-B.3 Addendum 1.
- F. Fiber patch cords shall be manufactured of single mode fiber meeting the transmission characteristics of the fiber optic backbone cabling. The manufacturer of the fiber patch cord cabling and the fiber backbone cabling shall be identical.
- G. Fiber patch cord connectors shall be duplex LC-type. Cable shall be duplex zipcord. Cable jacket shall be orange in color with black lettering.
- H. Acceptable Products:
 - 1. Corning LANscape P/N 040402R53131XXXF.
 - 2. AFL Telecommunications P/N UDL-UDL-RZ-002-Q-XXX.
 - 3. Or Approved Equal.

2.11 RACK MOUNTED 120V UNINTERRUPTIBLE POWER SUPPLIES

- A. Provide UL listed rack mounted 1500VA, 2200VA or 3000VA uninterruptible power supplies as shown in the telecom rack/cabinet schedule. Uninterruptible power supplies shall meet the following physical specifications:
 - 1. 2 rack spaces high (2RU).
 - 2. Output voltage distortion less than 5% at full load.
 - 3. Output frequency 57 to 63 Hz.
 - 4. Crest Factor up to 5 to 1.
 - 5. Output connections: qty (6) NEMA 5-15R, qty (2) NEMA 5-20R.
 - 6. Input connection: NEMA 5-15P (1,500VA), NEMA 5-20P (2200VA), NEMA L5-30P (3000VA).
 - 7. Battery type: Maintenance free sealed leakproof lead acid battery with suspended electrolyte.
 - 8. 3 Hour typical recharge time.
 - 9. Computer interface ports, DB-9 RS-232, SmartSlot, USB.
 - 10. LED status display with load and battery bar graphs and on line, on battery, replace battery and overload indicators.
 - 11. Audible alarm when on battery and low battery condition.
 - 12. 480 Joules surge energy rating.
 - 13. Full time multi-pole noise filtering – meets UL 1449.
 - 14. 2-Year mfg warranty.

TECHNICAL SPECIFICATIONS

15. Regulatory approvals: BSMI, CSA, UL 1449, UL 1778, FCC Part 15 Class A.
 - B. Provide UPS with adequate cord length to plug into electrical outlets.
 1. Acceptable Products
 - a. American Power Conversion Smart UPS SUA1500RM2U (1500VA), SUA2200RM2U (2200VA), SUA3000RM2U (3000VA).
 - b. Or Approved Equal.
- 2.12 IP MANAGEMENT MODULES FOR UNINTERRUPTABLE POWER SUPPLIES
- A. Provide IP based management module with each UPS for remote monitoring. Module shall be capable of being accessed by web browsing software. Modules shall be manufactured by and shall be compatible with the UPS's.
 1. Modules shall accept RJ-45 10/100 Base-T Ethernet connection.
 2. Module shall accommodate the following network protocols (HTTP, HTTPS, IPv4, IPv6, NTP, SMTP, SNMP v1, SNMP v3, SSH V1, SSH V2, SSL, TCP/IP, Telnet).
 3. Module shall accommodate Radius Authentication.
 4. Acceptable Products:
 - a. American Power Conversion UPS Network Management Card 2 P/N AP9630.
 - b. Or Approved Equal.

PART 3 EXECUTION

3.01 GENERAL

- A. The MDF and IDF rooms shall contain electrical and communication equipment only with the exception of HVAC and fire suppression systems directly serving the room.
- B. No plumbing piping, HVAC piping, condensate lines, HVAC ductwork, fire sprinkler piping, steam piping, hydraulic piping, high voltage electrical conduits, etc. shall be routed in or through the Telecommunication rooms (MDF's and IDF's).

3.02 FLOOR MOUNTED RACKS

- A. Vendor-installed racks and cabinets shall be securely attached to the concrete floor using a minimum of (4) 5/8" hardware or as required by local codes.

TECHNICAL SPECIFICATIONS

- B. Racks and cabinets shall be placed with a minimum of 36" clearance from the walls on at least three sides (two of which must be front and rear) of the rack. When mounted in a row, maintain a minimum of 36" from the wall behind and in front of the row of racks and from the wall to at least one end of the row.
- C. All racks, free-standing cabinets, and wall-mount cabinets shall be bonded to the ground bar in each room with a separate #6 green insulated grounding conductor.
- D. Rack mount screws not used for installing patch panels and other hardware shall be bagged and left with the rack or cabinet upon completion of the installation.
- E. Rack mount termination equipment fields shall be installed as per the requirements specified by the manufacturer's installation guides.

3.03 PLYWOOD BACKBOARDS

- A. Mechanically fasten plywood sheets to wall. Run sheets vertically from 6" AFF to 8'-6" AFF.
- B. Where plywood will support backbone cabling, secure plywood to wall with sufficient fasteners to support 1,500 pounds of weight.

3.04 HORIZONTAL CABLE RUNWAY

- A. Should annotated vertical or horizontal clearances not be possible due to physical constraints of the designated space, the Contractor shall immediately contact the Owner's Representative for alternative specifications.

3.05 CABLE MANAGEMENT

- A. Neatly bundle cabling with Velcro tie wraps on the horizontal ladder rack. Space Velcro tie wraps at 1'-0" on center.
- B. Do not exceed qty (50) cables per bundle.
- C. Neatly dress horizontal cable from the horizontal ladder rack, through the rear vertical cable managers to the rear of the patch panels. Use Velcro cable ties as necessary to maintain cable bundles. Do not exceed the manufacturer's cable bend radius.
- D. Do not install cable ties to bundle patch cables.

3.06 PATCH PANELS

- A. Terminate and dress cables on the rear of the patch panels in accordance with manufacturer instructions using the provided rear cable management bar or bracket.

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- B. Maintain cable twists within ½” of the patch panel IDC blocks.

3.07 OPTICAL FIBER PATCH PANELS

- A. Fusion splice all backbone fibers in the splice trays mounted in the fiber termination cabinets.
- B. Secure backbone fiber cable sheath to the fiber patch panel with manufacturer supplied clamps. Route exposed fibers through fiber guides.

3.08 HORIZONTAL AND VERTICAL LADDER RACK

- A. Install horizontal ladder rack at elevations shown on the drawings. Bolt horizontal ladder rack to tops of equipment racks with custom cable runway elevation kit.
- B. Install vertical ladder to route cabling from floor penetrations to the overhead ladder rack. Install vertical ladder to route cabling from overhead conduit penetrations to the overhead ladder rack.
- C. Install triangular runway support brackets at a maximum of 4’-0” O.C. Secure support brackets to the stud wall framing with manufacturer’s recommended lag bolts.
- D. Secure continuous sections of runway together with butt splices. Install “L” brackets to bolt together perpendicular intersections of runway. Install wall support angles at perpendicular intersections of the ladder rack to the wall.
- E. Support and brace ladder rack from the building structure with threaded rod and Unistrut where runway is not routed adjacent to the wall and the span exceeds 4’-0”.
- F. Seismically brace ladder rack and tops of equipment racks as required by local building codes.
- G. De-burr all field cut sections of ladder rack prior to installation.
- H. Install bonding jumpers between sections of ladder rack to maintain ground continuity.
- I. Install touch-up paint to repair scratched or damaged ladder rack finish.

3.09 GROUNDING AND BONDING

- A. All components of the Telecommunications system shall be bonded and grounded in accordance with ANSI J-STD-607-A “Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications”.
- B. Bond equipment racks, cabinets, wiring blocks, conduits, cable tray, ladder rack, building entrance terminals and cable shields to the ground bar in each telecom

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room with #6 AWG ground conductors. Provide a separate ground conductor for each item. Do not daisy chain ground conductors.

- C. Bond the ground bar in each Telecom room to building steel (#4 AWG minimum). Cad weld the grounding conductor to the building steel. See grounding riser diagram for ground conductor sizes.
- D. Bond the ground bar in each Telecom room to the electrical panel serving that Telecom room (#4 AWG minimum). See grounding riser diagram for ground conductor sizes.
- E. Bond the Telecommunications Ground Bar (TGB) in each Telecom room to the Telecommunications Main Ground Bus (TMGB) with a Telecommunications Bonding Backbone (TBB) conductor. The minimum TBB conductor size shall be a #4 AWG and should be sized at 2 kcmil per linear foot of conductor length up to a maximum of 3/0 AWG. See grounding riser diagram for ground conductor sizes.
- F. Bond the Telecommunications Main Ground Bus (TMGB) to the main electrical building ground (#2 AWG minimum). See grounding riser diagram for ground conductor sizes.
- G. Grounding conductors shall be installed continuous. There shall be no splices or mechanical couplers.
- H. Locate the Telecommunications Main Grounding Bar within 5'-0" of the building entrance terminal(s) (BET).
- I. The Electrical Contractor shall test the continuity of all grounding conductors.

END OF SECTION 17110

TECHNICAL SPECIFICATIONS

SECTION 17130 INTERIOR COMMUNICATION PATHWAYS

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. Drawings and general provisions of the Contract, Including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.
- B. The Contractor shall provide all equipment, materials, labor, and services necessary to complete interior communication pathways and to ensure that the pathways are in compliance with requirements stated or reasonably inferred by this Specifications, and the Constructions Drawings.
- C. This section includes minimum requirements for communication pathways for horizontal and backbone cabling.
- D. This section includes minimum requirements for the following
 - 1. Conduit
 - 2. Sleeves
 - 3. Pull Boxes
 - 4. Velcro Tie Wraps
 - 5. Cable Hangers (J-Hooks)
 - 6. Measuring Tape and Pull String
 - 7. Innerduct
 - 8. Fire Stop

1.02 REGULATIONS AND CODE COMPLIANCE

- A. Materials and work specified herein shall comply with the requirements of 17010 1.4 and in particular the following code requirements
 - 1. ANSI/TIA-568-C.0 – Generic Telecommunications Cabling for Customer Premises.
 - 2. ANSI/TIA-568-C.1 – Commercial Building Telecommunications Cabling Standard.
 - 3. ANSI/TIA-568-C.1 – Commercial Building Telecommunications Cabling Standard.
 - 4. ANSI/TIA-569-B – Commercial Building Standard for Telecommunications Pathways and Spaces.
 - 5. ANSI/TIA-606-A -- The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
 - 6. ANSI-J-STD-607-A -- Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
 - 7. ANSI/NFPA-70, 2005 -- National Electrical Code (NEC).
 - 8. Underwriter's Laboratories, Inc. (UL).

1.03 QUALITY ASSURANCE

TECHNICAL SPECIFICATIONS

- A. All pathways and associated equipment shall be installed in a neat and workmanlike manner. Conduit, J-hooks, cable tray and pull boxes shall be installed and properly coordinated with other trades so that they are fully accessible for installation and pulling of cable. All methods of construction that are not specifically described or indicated in the Specifications shall be subject to the control and approval of the Owner's Representative.

1.04 SUBMITTALS

- A. The Contractor shall provide product manufacturers data sheets for the following Items
 - 1. Cable Tray.
 - 2. Velcro tie wraps.
 - 3. Measuring tape / pull string.
 - 4. Innerduct.
 - 5. Firestop.
- B. Bill of Materials: Submit a detailed bill-of-materials listing all manufacturers, part numbers, and quantities proposed for use on this project.
- C. Shop drawings indicating the proposed layout and elevation of the following items shall be submitted for review and approval.
 - 1. Cable tray.
 - 2. Conduit 2" and larger.
 - 3. Pull boxes.
 - 4. Main J-Hook runs.
 - 5. Sleeves.
- D. As-built drawings shall be submitted at the completion of the project showing the actual routing and location of the following items:
 - 1. Cable Tray.
 - 2. Conduit 2" and larger.
 - 3. Pull boxes.
 - 4. Sleeves
 - 5. Main J-Hook runs.

PART 2 PRODUCTS

2.01 CONDUITS

- A. See Electrical Specifications for additional raceway and j-box products and additional requirements.
- B. Install conduit where shown on the drawings.
- C. All backbone fiber and copper telecom cabling shall be installed in conduit.

TECHNICAL SPECIFICATIONS

- D. Conduit shall be concealed unless otherwise noted on the drawings.
- E. Install conduit for horizontal telecom cabling where cable is routed through inaccessible areas including but not limited to walls, floors, chases, above gypboard or plaster ceilings, etc.
- F. Install ground bushing on ends of conduit at telecommunication rooms. Install a #6 green insulated ground conductor from the ground bushing to the grounding bar in the telecommunication room.
- G. Install a 4" square outlet box and 1" conduit (UON) to an accessible ceiling space at each wall or floor mounted telecom outlet. Where the conduit stubs into an accessible ceiling space, install a plastic bushing on the end of the conduit to prevent damage to the cable jacket.
- H. Where conduit penetrations are exposed in finished areas, install steel, chrome plated split ring escutcheon plates.

2.02 SLEEVES

- A. See the Electrical Specifications for acceptable products and additional requirements.
- B. Provide 4" vertical steel sleeves where shown on the drawings and to accommodate conduit or cable routing through floor slabs. Sleeves shall extend 6 inches above and below the floor slab and shall be cast into the concrete. Where sleeves are core drilled into the concrete, install firestopping material between the sleeve and the floor slab to maintain the floor rating. Provide plastic or nylon bushings on both sides of sleeves to prevent damage to cabling.
- C. Provide 4" horizontal sleeves where shown at telecom rooms or rated walls to accommodate routing of horizontal cabling from the corridors. Sleeves should extend 2" beyond the wall on both sides. Provide plastic or nylon bushings on both sides of sleeves to prevent damage to cabling.
- D. Install split sleeves (not shown on the drawings) to accommodate routing of horizontal cabling through non-rated full height gypboard walls. Sleeves shall be sized so as not to exceed a 40% fill rate. Install firestopping between the sleeve and structure, and between the telecom cables and the sleeve to maintain the wall rating.
- E. Where sleeve penetrations are exposed, install steel, chrome plated split ring escutcheon plates.

2.03 PULL BOXES

- A. See the Electrical Specifications for additional pull box requirements and acceptable manufacturers.
- B. Provide pull boxes where shown on the drawings to accommodate copper backbone cable splices.

TECHNICAL SPECIFICATIONS

- C. Provide pull boxes in backbone cabling conduit every 100 feet and every 180 degrees of bend (whichever is the more strict provision) to facilitate pulling of backbone cabling.
- D. Pull boxes shall be sized so as not to exceed the minimum bend radius of the backbone fiber and copper cabling.
- E. Coordinate location of pull boxes with other trades. Provide access doors where required to access pull boxes.

2.04 CABLE HANGERS (J-HOOKS) AND SUPPORTS

- A. Provide cable hangers (J-hooks) spaced at 4'-0" centers to support horizontal cable from the workstation outlet to the cable tray.
- B. Hangers shall be prefabricated, zinc coated, carbon steel hangers designed specifically for Category 6 cable installations.
- C. Hangers shall have an open top and rolled edges. Hangers shall have a minimum 2" and maximum 4" diameter loop.
- D. Hangers shall be supported directly from the building structure. The Contractor shall provide anchors, beam clamps, threaded rod, rod fasteners, flange clips and brackets as needed to support the cable hangers from the building structure. Do not attach hangers to ceiling support wires or other support systems installed by other building trades.
- E. J-hooks shall not support more cables than recommended by the manufacturer. J-hooks shall be sized to provide a minimum 20 percent spare capacity.
- F. Cable bundles shall not exceed (25) cables and shall be loosely bound with Velcro cable straps.
- G. Acceptable Products
 - 1. Erico Caddy CableCat Clips.
 - 2. B-Line Cable Hook System.
 - 3. Panduit J-Pro Cable Support System.
 - 4. Or equal.

2.05 VELCRO CABLE STRAPS

- A. Install Velcro cable ties cut to length from a continuous roll to loosely bundle horizontal cabling routed down J-hook lines, on the cable tray and ladder rack.
- B. Install Velcro cable ties at 2'-0" intervals outside of the telecom room and 1'-0" intervals inside the telecom room.
- C. Do not exceed qty (50) cables per bundle.

TECHNICAL SPECIFICATIONS

- D. Provide plenum rated Velcro tie wraps where cable is routed in plenum spaces.
- E. Do not use plastic tie wraps.
- F. Acceptable Products
 - 1. Panduit HLS-15R6 or HLSP (plenum rated).
 - 2. Leviton 43115-075.
 - 3. Or equal.

2.06 MEASURING TAPE AND PULL STRING

- A. Install pull string in all conduit and innerduct. Pull string shall be ½” pre-lubricated high strength woven polyester with sequential foot markings. The tensile strength of the pull string shall be greater than or equal to 1,250 lbs.
- B. Pull string shall meet or exceed the requirements of Bellcore GR-356-CORE “Generic Requirements for Optical Cable Innerduct and Accessories”.
- C. Acceptable Products
 - 1. Carlon TL145xx.
 - 2. A-D Technologies Bull-Line WP12xx.
 - 3. Or equal.

2.07 INNERDUCT

- A. Provide UL Listed innerduct where shown on the drawings and for installation of all fiber optic cabling.
- B. Innerduct should be terminated at the fiber optic termination cabinets.
- C. Provide 1.25” minimum ID innerduct unless otherwise noted. Innerduct shall be constructed of plenum or riser rated plastic and shall have sequential footage markers at regular intervals. Innerduct shall be orange in color UON.
- D. Innerduct couplings shall be used to join segments of innerduct together. Couplings shall be manufactured by the same manufacturer as the innerduct.
- E. Acceptable Products
 - 1. Carlon Riser-Gard or Plenum-Gard.
 - 2. Amp Netconnect 1435736-4 (Riser) or 1435737-4 (Plenum).
 - 3. Or equal.

2.08 FIRE STOPPING

- A. Provide fire stopping and backing material between sleeves/conduit penetrations through rated partitions or floors. Provide fire stopping in sleeves/conduits after all cables have been installed.

TECHNICAL SPECIFICATIONS

- B. The minimum required fire resistance ratings of the wall of floor assembly shall be maintained by the fire stop system. The installation shall provide an air and watertight seal.
- C. Fire stopping shall be listed or classified by an approved independent testing laboratory. The system shall meet the requirements of "Fire Tests of Through-Penetration Fire Stops" designated ASTM E814.
- D. Manufacturer's recommended installation standards shall be closely followed (i.e. minimum depth of material, use of ceramic fiber and installation procedures).
- E. For each firestopping system on the project, submit the page from the UL fire resistance directory showing the firestopping system.
- F. Acceptable Manufacturers
 - 1. 3M.
 - 2. Hilti.
 - 3. Nelson.
 - 4. Specified Technology.
 - 5. Or equal.

PART 3 EXECUTION

3.01 COORDINATION DRAWINGS

- A. Provide coordination drawings indicating routing of all tray, conduit, sleeves and pull boxes. Coordinate routing with Mechanical, Electrical, Plumbing and Sprinkler trades.

3.02 COMMUNICATION PATHWAYS

- A. Prior to cable installation, the Contractor shall verify that the telecommunications pathways are installed as specified in the Drawings and Specifications. Any variations or violations from these documents shall be immediately reported to the Owner's Representative. No portion of the Structured Cabling System shall be installed in any component of the Telecommunications Pathways and Spaces which deviates from these documents. All cabling designated on the Blueprints as terminating within a specific Telecom Room shall be installed as such unless otherwise specified in writing by the Owner's Representative.
- B. Cabling for other trades shall not occupy any pathway utilized for telecommunications cabling.
- C. The cable tray shall be installed so that a minimum of 6" clear space is maintained above the top of the tray to facilitate cable installation. The contractor shall coordinate the routing of the cable tray with other trades so that plumbing piping, fire sprinkler piping, ductwork, conduits, etc are not routed within the 6" clear space above the tray.

TECHNICAL SPECIFICATIONS

- D. The contractor shall reroute the cable tray and shall provide vertical and horizontal offsets as necessary to coordinate the installation with structure and other trades including HVAC, electrical, plumbing and sprinkler.
- E. The drawings are diagrammatic and provide a general routing for conduit, J-hooks and cable tray. The Contractor shall coordinate the exact routing of the communication raceway systems with other trades and the building structure. Pull boxes shall be installed to provide access for cable installation, inspection and maintenance.
- F. Install conduit where shown on the drawings or required to route telecom cabling in inaccessible ceiling or wall spaces.
- G. Cable pathways including conduit, cable tray, sleeves, and J-hooks shall be sized for 20% fill capacity. Initial fill for all J-hook systems shall not exceed 25 cables (half of 50 cable maximum bundle size).
- H. When installing conduit, J-hooks and cable tray, the Contractor shall maintain the following minimum clearance from sources of electro-magnetic interference (EMI).
 - 1. 6" clear from power conductors.
 - 2. 12" clear from fluorescent lighting fixtures and ballasts.
 - 3. 36" clear from transformers and motors.
- I. Provide all items necessary for the support and seismic bracing of conduit and cable tray including concrete anchors, clamps, brackets, hanger rods, unistrut, splice plates, couplers, expansion joint assemblies, etc.
- J. The conduit and cable tray system shall provide a continuous ground path per the National Electrical Code. Conduit and tray shall be bonded to ground at the telecom rooms. All sections of the backbone conduit and tray shall be mechanically fastened and bonding jumpers shall be installed as necessary to provide continuous ground path.
- K. In order to maximize floor and wall space in the telecom rooms, all conduit must be stubbed into the room above the ladder rack UON. Conduits shall not be stubbed up through the floor slab unless specifically shown on the drawings.

3.03 SLEEVES

- A. Install sleeves through walls and floors as required to route horizontal and backbone cabling. Install firestop pathways where indicated on the drawings.
- B. Coordinate layout and installation of concrete wall and floor sleeves prior to concrete pours. Contractor is responsible for providing, installing, securing and covering sleeves. The contractor shall have field personnel on site during concrete pours to ensure that sleeves are not dislodged or moved during concrete pours. Contractor will be responsible for core drilling costs related to missed or improperly located sleeves.

TECHNICAL SPECIFICATIONS

- C. Provide sleeves for penetration of all gypboard walls. Layout wall penetrations as directed by the General Contractor and provide split sleeves to the framing contractor for installation.

3.04 CUTTING AND PATCHING

- A. Contractor is responsible for core drilling existing walls and floor slabs to accommodate sleeves and conduit. Provide core sizes and layout to the Structural Engineer for approval prior to core drilling. Protect existing finishes from water damage during core drilling and cleanup all related water and debris.

3.05 CABLE HANGERS

- A. Secure cable tray and J-hook hanger supports directly to the building structure. Hangers shall not be supported from ceiling supports, electrical conduits, plumbing pipes, sprinkler piping, ductwork, ceiling mounted equipment or their supports unless it is part of engineered system.
- B. Install J-hooks on a maximum of 4'-0" centers. Install J-hooks a minimum of 6" above ceiling tiles to facilitate ceiling tile removal and a maximum of 2'-0" above ceiling tiles to facilitate cable installation.

END OF SECTION 17130

TECHNICAL SPECIFICATIONS

SECTION 17140 EXTERIOR COMMUNICATION PATHWAYS

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. The Contractor shall provide all equipment, materials, labor, and services necessary to complete the exterior communication pathways and to ensure that they are in compliance with requirements stated or reasonably inferred by the Specifications and the Construction Drawings.
- B. This section includes requirements for underground conduit and communication vaults as shown on the Electrical Site Plan.
- C. Minimum requirements and installation methods are included for the following:
 - 1. Conduit
 - 2. Heavy Wall Corrugated Innerduct (Outside Plant)
 - 3. Corrugated Innerduct (Premise)
 - 4. Pull rope
 - 5. Waterproofing

1.02 REGULATIONS AND CODE COMPLIANCE

- A. Materials and work specified herein shall comply with the requirements of Specification Section 16701 1.03 and in particular the following code requirements:
 - 1. ANSI/TIA-569-B – Commercial Building Standard for Telecommunications Pathways and Spaces.
 - 2. ANSI/TIA-758-A -- Customer-Owned Outside Plant Telecommunications Infrastructure Standard.
 - 3. ANSI/NFPA-70, 2005 -- National Electrical Code (NEC).
 - 4. Underwriter's Laboratories, Inc. (UL).

1.03 SUBMITTALS

- A. Manufacturer's Data Sheets: Provide data sheets for the following products:
 - 1. PVC conduit.
 - 2. Rigid Steel Conduit.
 - 3. Innerduct.
- B. Bill of Materials: Submit a detailed bill-of-materials listing all manufacturers, part numbers, and quantities proposed for use on this project.
- C. As-Built Drawings: Provide as-built drawings for the outside plant conduit and vaults. Drawings must be dimensioned off of building lines or curbs indicating the exact routing of the conduit and location of vaults.

TECHNICAL SPECIFICATIONS

PART 2 PRODUCTS

2.01 PVC CONDUIT

- A. Provide PVC conduit as shown on the Site Plan. Conduit shall be rated for direct burial, ultraviolet resistant, and conforming to UL Standard 651, NEC 347, Federal Specification W-C-1094A, Schedule 40 or Schedule 80 as specified on drawings.
- B. PVC fittings shall be the same material as conduit and installed with watertight joint compound recommended by manufacturer.
- C. Install spacers as required to maintain proper separation between multiple conduits in a run.
 - 1. Acceptable PVC Conduit manufactured by:
 - a. Carlon
 - b. Queen City Plastics
 - c. Certainteed Corporation
 - d. Pacific Western Extruded Plastics
 - e. Georgia Pipe Company
 - f. Hubbell Incorporation
 - g. Cantex Incorporation
 - h. Triangle

2.02 RIGID METAL CONDUIT

- A. The PVC conduit shall transition to rigid metal conduit a minimum of 10 feet from the building foundation. Rigid metal conduit shall be routed from that point to the stub up location in the building.
- B. Stub ups in the telecom rooms shall be vinyl coated rigid steel.
- C. Rigid metal galvanized steel conduit (RMC) shall conform to Federal Specification WW-C-581E, NEC Article 346, ANSI Standard C80.1 and U.L. Standard No. 6 for rigid metallic conduit, except hot dipped galvanized after threading.
- D. Fittings, sweeps, couplings, etc., shall be galvanized threaded type meeting above standards. Threadless fittings shall not be used.
 - 1. Acceptable RMC Manufacturers:
 - a. Allied Tube and Conduit Corporation
 - b. LTV Steel Tubular Productions Co.
 - c. Midwest Electric-Cooper Industries
 - d. Wheatland Tube Company
 - e. Western Tube and Conduit Corp.

TECHNICAL SPECIFICATIONS

f. Triangle Wire and Cable Inc.

2. Acceptable Bushing Manufacturers:

- a. Appleton
- b. Thomas & Betts
- c. OZ/Gedney
- d. Midwest
- e. Steel City

2.03 HEAVY WALL CORRUGATED INNERDUCT (OUTSIDE PLANT)

- A. Provide 1 ¼" innerduct unless otherwise noted.
- B. Innerduct shall be constructed of high density polyethylene and shall have sequential footage markers at regular intervals.
- C. Innerduct couplings shall be used to join segments of innerduct together. Couplings shall be manufactured by the same manufacturer as the innerduct.
- D. Acceptable Products:
 - 1. Carlon Corrugated HDPE.
 - 2. Or Approved Equal

2.04 CORRUGATED INNERDUCT (PREMISE)

- A. Provide 1 ¼" innerduct unless otherwise noted. Innerduct shall be constructed of riser rated plastic and shall have sequential footage markers at regular intervals.
- B. Innerduct couplings shall be used to join segments of innerduct together. Couplings shall be manufactured by the same manufacturer as the innerduct.
- C. Acceptable Products:
 - 1. Carlon Riser-Gard.
 - 2. Or Approved Equal

2.05 PULL ROPE

- A. Pull rope shall be installed in each outside plant conduit.
- B. Pull rope shall be secured to the plywood backboard at the telecom rooms and to the unistrut racking in the pullboxes.
- C. Provide 3/8" nylon pull rope with sequential foot markings.

PART 3 EXECUTION

3.01 UTILITY COORDINATION

TECHNICAL SPECIFICATIONS

- A. Contact local utility companies prior to excavation to locate and mark underground utilities.
- B. Coordinate conduit routing with existing underground utilities. Reroute conduit as necessary to avoid and to provide necessary clearances from existing utilities.

3.02 CONDUIT

- A. OSP conduits shall be installed with a slight drain slope (0.125 inches-per-foot) away from buildings to prevent the accumulation of water in the conduit or ingress to the buildings.
- B. Factory-manufactured sweeps which meet ANSI/TIA/EIA569-A bend radius requirements shall be used for all telecommunications conduit. The bend radius of the sweeps must be a minimum of 10-times the internal conduit diameter. Bending conduit in the field using manual or mechanical methods is not acceptable.
- C. Any 4" conduit with a sweep of more than 11 degrees is to have a minimum concrete encasement of 4".
- D. OSP conduits shall be installed a minimum of 48" below finished grade. Conduits shall be encased in hard-tamped sand a minimum of 6" above and below the conduits. 6" clear space shall be maintained between conduits. Backfill above the conduits shall be installed and compacted to 95% density.
- E. OSP conduit and duct bank runs must have a continuous orange colored, metal detectable warning tape installed half the distance between the top of the conduit and the finished grade.
- F. All cable shall be installed in the lowest available conduit in a duct bank, working up as additional cables are installed.
- G. Prior to installing cables, all new or unused OSP conduits must be cleaned with a brush pulled through the conduit at least two times in the same direction and swabbed with clean rags until the rag comes out of the conduit clean and dry. Conduits shall then be tested with a mandrel to prove compliance with the sweep radius requirements throughout the conduit run.
- H. Spare OSP conduits and innerducts shall be plugged with watertight plugs at both ends to prevent the intrusion of moisture, gasses, and rodents throughout the construction project.
- I. All OSP conduits and innerduct shall have a 3/8" nylon pull rope installed. Pull tape shall be re-pulled each time an additional cable is installed.

3.03 PULL BOXES

- A. Install pull boxes at finished grade.

TECHNICAL SPECIFICATIONS

- B. Conduits shall enter pull boxes from the side. Do not sweep conduits into the bottom of the box.

3.04 CUTTING AND PATCHING

- A. Sawcut and remove existing pavement, sidewalks, gutters, etc to accommodate installation of outside plant conduit.
- B. Replace sub-base, pavement, sidewalks gutters, etc to match existing.
- C. Repair and replace all landscaping and sitework disturbed by excavation including but not limited to irrigation lines, lawns, planting, etc. Resod lawn areas disturbed by excavation.

END OF SECTION 17140

TECHNICAL SPECIFICATIONS

SECTION 17150 BACKBONE CABLING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. Drawings and general provisions of the Contract, Including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.
- B. The Contractor shall provide all equipment, materials, labor, and services necessary to complete the backbone cabling system, and to ensure that it is in compliance with requirements stated or reasonably inferred by the Specifications and the Contract Drawings.
- C. Backbone cabling includes inter-building (Outside Plant) and intra-building (Premise) copper and fiber optic cabling.
- D. This section includes minimum requirements for the following
 - 1. Singlemode Loose Tube Fiber Optic Cabling – Outside Plant
 - 2. Singlemode Fiber Optic Connectors

1.02 RELATED SECTIONS AND DOCUMENTS

- A. See Specification Section 17110 “Communication Equipment Rooms” for backbone fiber cable termination cabinets and backbone copper patch panels.

1.03 REGULATIONS AND CODE COMPLIANCE

- A. Materials and work specified herein shall comply with the requirements of Specification Section 17010 1.4 and in particular the following code requirements
 - 1. ANSI/TIA-568-C.0 – Generic Telecommunications Cabling for Customer Premises.
 - 2. ANSI/TIA-568-C.1 – Commercial Building Telecommunications Cabling Standard.
 - 3. ANSI/TIA-568-C.3 – Optical Fiber Cabling Components Standard.
 - 4. ANSI/TIA-606-A -- The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
 - 5. ANSI-J-STD-607-A -- Commercial Building Grounding (Earthing) and Bonding ANSI/NFPA-70, 2005 -- National Electrical Code (NEC).
 - 6. Underwriter’s Laboratories, Inc. (UL).

1.04 QUALITY ASSURANCE

- A. All materials shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the Specifications shall be subject to the control and approval of the Owner's Representative.

TECHNICAL SPECIFICATIONS

Equipment and materials shall be of the quality and manufacturer indicated. The equipment specified is based upon the acceptable manufacturers listed.

- B. All fiber optic cabling and related fiber termination equipment shall be installed by a trained technician with a minimum of (2) years experience in the termination of fiber optic cabling. The technician will have received training through a nationally recognized program offered by BICSI, Corning, AT&T, 3M or equivalent. The contractor shall provide all specialized tools required for proper installation.

1.05 SUBMITTALS

- A. Submit manufacturers' data sheets for the following
 - 1. Singlemode Loose Tube Fiber Optic Cabling – Outside Plant
 - 2. Singlemode Fiber Optic Connectors
- B. Bill of Materials: Submit a detailed bill-of-materials listing all manufacturers, part numbers, and quantities proposed for use on this project.
- C. Submit all factory test information of cables prior to installation of the product.

1.06 DELIVERY, STORAGE & HANDLING

- A. Visually examine cable spools and boxes for damage after delivery to the jobsite prior to installation. Visibly damaged goods are to be returned to the supplier and replaced at no additional cost to the Owner.

1.07 GUARANTEE

- A. The outside plant (OSP) and premise fiber optic cabling including fiber termination cabinets, fiber connectors, fiber optic patch cords, etc. shall be covered by a 25-year system warranty from Corning LANscape, AFL Telecommunications or equal (see Specification Section 17010 1.9).

PART 2 PRODUCTS

2.01 SINGLEMODE LOOSE TUBE FIBER OPTIC CABLING – OUTSIDE PLANT

- A. Provide cables with fiber strand counts as shown on the drawings.
- B. Do not route more than 50'-0" of exposed outside plant cabling inside the building. If this is not possible, cabling shall be routed in rigid conduit.
- C. Fiber optic cables shall be loose tube, outdoor rated and suitable for installation in underground ducts.
- D. Cable shall have a polyethylene outer jacket.
- E. Fiber optic cables shall have integral waterblocking tape.

TECHNICAL SPECIFICATIONS

F. Physical Characteristics

1. The cable shall have individual fiber tube colors per TIA/EIA-606 and overall orange jacket.
2. The cable shall contain an aramid yarn strength member with cables stranded around center.
3. The cable shall be suitable for temperatures of -40° to +70° C.

G. Acceptable Products:

1. LANscape Altos 0XXEU4-T4101D20.
2. AFL Telecommunications LE0XX9C5101N1.
3. Or Approved equal.

2.02 RACK MOUNTED OPTICAL FIBER TERMINATION CABINETS & MODULAR FUSION SPLICE CASSETTES

A. Provide 19" rack mounted optical fiber termination cabinets. See rack elevations for quantity, size and port density of panels.

B. Provide fiber termination cabinets with the following physical characteristics:

1. 1RU (accepts 2 cassettes), 2RU (accepts 4 cassettes) and 4RU (accepts 12 cassettes) in size.
2. Black smoked Plexiglas front cover.
3. Integral cable strain relief clamps.
4. Panels shall accept factory manufactured modular pigtail cassettes with duplex LC connectors. Fusion splicing will occur within splice trays integral to the fiber cassettes. The fiber cassettes will then snap into the termination cabinets.

C. Acceptable Products

1. Corning Cable Systems Closet Connector Housing P/N CCH-01U (1RU 48-fiber total), P/N CCH-02U (2RU 96-fiber total) and P/N CCH-04U (4RU 288-fiber total).
2. Or equal.

D. Provide quantity of duplex LC singlemode and multimode factory pre-terminated pigtail splice cassettes to terminate all backbone fiber optic cabling as shown on the drawings. Provide blank adapter panels over unused ports in fiber termination cabinets. Modular cassettes shall have factory installed LC connectors with fiber pigtails. Connectors and pigtails shall match the type of backbone fiber being terminated.

1. Acceptable Products:

- a. 12-Strand (OS2) Single Mode Fiber Pre-terminated Pigtail Cassettes:
 - (1) Corning Cable Systems P/N CCH-CS12-A9-P00RE.
 - (2) Or equal.

TECHNICAL SPECIFICATIONS

- b. 12-Strand (OM3) Multimode Fiber Pre-terminated Pigtail Cassettes:
 - (1) Corning Cable Systems P/N CCH-CS12-E4-P00TE.
 - (2) Or equal.
- c. 24-Strand (OS2) Single Mode Fiber Pre-terminated Pigtail Cassettes:
 - (1) Corning Cable Systems P/N CCH-CS24-A9-P00RE (provide additional heat-shrink fusion splice protectors as required P/N 2806031-01).
- d. 24-Strand (OM3) Multimode Fiber Pre-terminated Pigtail Cassettes:
 - (1) Corning Cable Systems P/N CCH-CS24-E4-P00TE (provide additional heat-shrink fusion splice protectors as required P/N 2806031-01).
 - (2) Or equal.

PART 3 EXECUTION

3.01 BACKBONE CABLING

- A. Twenty feet of fiber cable slack shall be stored in wall mounted "re-closeable" storage rings at the telecom room for every installed cable. Additional cable slack will be installed within the vertical cable managers in a "drip loop" configuration.
- B. No more than 50'-0" of exposed outside plant cabling shall be permitted inside the building.
- C. Vertical runs of cable shall be supported to a messenger strand, cable ladder, or other method to provide proper support for the weight of the cable.
- D. Backbone cables spanning more than three floors shall be securely attached at the top of the cable run with a wire mesh grip and on alternating floors or as required by local codes.
- E. Three feet of fiber slack shall be neatly coiled within the fiber enclosure.
- F. Each optical fiber cable shall be individually attached to its enclosure by mechanical means. The cables strength member shall be securely attached the cable strain relief bracket in the enclosure. Refer to manufacturer installation instructions.
- G. Each optical fiber cable shall be clearly labeled at the entrance to the enclosure. Cables labeled within the bundle where the label is obscured from view shall not be acceptable.
- H. Prior to installation of fiber optic backbone cable, test one fiber strand using an OTDR or light meter to verify continuity of the cable.

TECHNICAL SPECIFICATIONS

- I. All fiber optic cable shall be installed within fabric innerduct. Where the innerduct terminates at the telecom room wall or floor, install riser rated corrugated innerduct from that point to the fiber termination cabinet.

3.2 OPTICAL FIBER CONNECTORS

- A. Adhere to all manufacturer installation guidelines.
- B. Polarization for entire system shall be maintained as described in ANSI/TIA/EIA – 568-B.1 Section 10.3.2.

END OF SECTION 17150

TECHNICAL SPECIFICATIONS

SECTION 17160 HORIZONTAL CABLING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. The Contractor shall provide all equipment, materials, labor, and services necessary to complete the horizontal cabling system, and to ensure that it is in compliance with requirements stated or reasonably inferred by the Specifications and the Contract Drawings.
- B. The horizontal cabling is that portion of the telecommunication cabling system that extends from the work area telecommunications outlet to the patch panel or termination block in the telecommunications room.
- C. This section includes minimum requirements for the following
 - 1. Horizontal Category 6 Cabling.
 - 2. Category 6 8-Position Jacks
 - 3. Work Area 4-Port Plastic Faceplates
 - 4. Work Area 4-Port Stainless Steel Faceplates
 - 5. Work Area 2-Port Surface Mounted Side Entry Box
 - 6. Category 6 Workstation Cords.
 - 7. Velcro Cable Straps

1.02 REGULATIONS AND CODE COMPLIANCE

- A. Materials and work specified herein shall comply with the requirements of Specification Section 17010 1.04 and in particular the following code requirements
 - 1. ANSI/TIA-568-C.0 – Generic Telecommunications Cabling for Customer Premises.
 - 2. ANSI/TIA-568-C.1 – Commercial Building Telecommunications Cabling Standard.
 - 3. ANSI/TIA-568-C.2 – Balanced Twisted-Pair Telecommunication Cabling and Components Standard.
 - 4. ANSI/TIA-606-A -- The Administration Standard for the Telecommunications
 - 5. ANSI/NFPA-70, 2005 -- National Electrical Code (NEC).
 - 6. Underwriter's Laboratories, Inc. (UL).

1.03 QUALITY ASSURANCE

- A. All materials shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the Specification shall be subject to the control and approval of the Owner's Representative. Equipment and materials shall be of the quality and the manufacturer indicated.

TECHNICAL SPECIFICATIONS

The equipment specified is based upon the acceptable manufacturers listed.

- B. The Contractor shall strictly adhere to all Category 6 installation practices when installing unshielded twisted-pair cabling.

1.04 SUBMITTALS

- A. Manufacturer's Data Sheets: Submit manufacturers data sheets for the following items

1. Horizontal Category 6 Cabling.
2. Category 6 8-Position Jacks
3. Work Area 4-Port Plastic Faceplates
4. Work Area 4-Port Stainless Steel Faceplates
5. Work Area 2-Port Surface Mounted Side Entry Box
6. Category 6 Workstation Cords.
7. Velcro Cable Straps

- B. Bill of Materials: Submit a detailed bill-of-materials listing all manufacturers, part numbers, and quantities proposed for use on this project.

1.05 DELIVERY, STORAGE & HANDLING

- A. Visually inspect all cables, cable reels, and shipping cartons to detect possible cable damage incurred during shipping and transport. Visibly damaged goods are to be returned to the supplier and replaced at no additional cost to the Owner.

1.06 GUARANTEE

- A. The Category 6 horizontal voice and data cabling system including work area jacks, horizontal cabling, patch panels and patch cords shall be covered by a minimum 20-year system warranty from Belden/CDT, CommScope or approved equal (see Specification Section 17010 1.9).
- B. The Telecom Contractor will be responsible for fulfilling the requirements necessary to obtain one of the specified product warranties. This may require that the Contractor be a "Certified Installer" by the manufacturer. It may also require manufacturer specialized training, field installation oversight, field test verification, etc.

PART 2 PRODUCTS

2.01 HORIZONTAL CATEGORY 6 CABLE

- A. The horizontal cabling must meet the specific manufacturer system warranty requirements listed in Specification Section 17160 1.6.

TECHNICAL SPECIFICATIONS

- B. Horizontal data and voice cabling shall be 4-pair, Category 6 unshielded twisted pair.
- C. 3 CAT 6 cable drops (2 data and 1 voice) will be provided at all workstation outlets unless otherwise noted on the drawings.
- D. Physical Characteristics
 - 1. Category 6 cable shall meet or exceed the requirements of ANSI/TIA/EIA-568-B.2 and ANSI/TIA/EIA-568-B.2 Addendum 1.
 - 2. Cable shall have a listed plenum rated jacket (CMP).
 - 3. The cable jacket must have the following legible markings
 - a. Manufacturer's name.
 - b. Copper conductor gauge.
 - c. Pair count.
 - d. UL and CSA listing.
 - e. Manufacturer's trademark.
 - f. Category rating.
 - g. Sequential foot markings, in one foot increments.
 - h. Jacket rating (CMP).
 - 4. Horizontal data cable shall have a blue jacket with black lettering. Horizontal voice cable shall have white jacket with black lettering.
- E. Transmission Characteristics
 - 1. Cable shall conform to ANSI/TIA/EIA-568-B.2 Addendum 1 as shown below.

Frequency (MHz)	Solid Conduct or Cable Insertion Loss (dB)	NEXT Loss (dB)	PSNEXT Loss (dB)	ELFEXT Loss (dB)	Power Sum ELFEXT (dB)	Return Loss (dB)
1	2.0	74.3	72.3	67.8	64.8	20.0
4	3.8	65.3	63.3	55.8	52.8	23.0
8	5.3	60.8	58.8	49.7	46.7	24.5
10	6.0	59.3	57.3	47.8	44.8	25.0
16	7.6	56.2	54.2	43.7	40.7	25.0
20	8.5	54.8	52.8	41.8	38.8	25.0
25	9.5	53.3	51.3	39.8	36.8	24.3
31.25	10.7	51.9	49.9	37.9	34.9	23.6
62.5	15.4	47.4	45.4	31.9	28.9	21.5
100	19.8	44.3	42.3	27.8	24.8	20.1
200	29.0	39.8	37.8	21.8	18.8	18.0

TECHNICAL SPECIFICATIONS

250	32.8	38.3	36.3	19.8	16.8	17.3
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2. Propagation delay skew shall not exceed 45 ns per 100 meters for all frequencies from 1 MHz to 250 MHz.

F. Acceptable Products:

8. Belden/CDT Gigaflex 2400 P/N 24567915 (blue), 24567315 (white).
9. CommScope Uniprise Media 6 6504+ Plenum P/N 87736xx/xx (blue), 87737xx/xx (white).
10. Or equal.

2.02 CATEGORY 6 MODULAR JACKS

- A. The modular jacks must meet the specific manufacturer system warranty requirements listed in Specification Section 17160 1.6.
- B. All modular jacks shall be 8-pin Category 6 and will conform to the requirements of ANSI/TIA/EIA-568-B.2 Addendum 1.
- C. Pin/Pair assignment shall be in accordance with T568B.
- D. Modular jacks shall be manufactured by the same manufacturer as the patch panels in the telecommunication rooms.
- E. Work area jacks for voice and data systems shall have different colors. Data jacks will be blue and voice jacks white.
- F. Modular jacks shall have a 'CAT 6' designation on the face of the jack insert.
- G. Modular jacks shall be "Keystone" style.
- H. Acceptable Products:
 1. Belden/CDT 4-Port KeyConnect Faceplate P/N AX102249 (color white) – verify color w/Architect.
 2. CommScope Uniprise M14L-246 (color white) – verify color w/Architect.
 3. Or equal.

2.03 WORK AREA 4-PORT PLASTIC FACEPLATES

- A. The faceplates must meet the specific manufacturer system warranty requirements listed in Specification Section 17160 1.6.
- B. Provide UL listed faceplates. Faceplates should be white (verify with Architect), flush mounted and manufactured of high impact thermoplastic.
- C. Faceplates shall have top and bottom label holders with plastic inserts.

TECHNICAL SPECIFICATIONS

- D. Provide faceplates with a minimum of 4 and a maximum of 6 modules. Provide blank inserts in unused openings.
- E. Faceplates shall accept “Keystone” style modular jacks.
- F. Faceplates shall be manufactured by the same manufacturer as the outlet jacks and shall be compatible with the submitted outlet jacks.
- G. Acceptable Products:
 - 1. Belden/CDT 4-Port KeyConnect Faceplate P/N AX102249 (color white) – verify color w/Architect.
 - 2. CommScope Uniprise M14L-246 (color white) – verify color w/Architect.
 - 3. Or equal.

2.04 WORK AREA 4-PORT STAINLESS STEEL FACEPLATES

- A. Provide UL listed stainless steel faceplates at workstation outlets.
- B. Provide 4-port faceplates. Provide blank inserts in unused openings.
- C. Faceplates shall accept “Keystone” style modular jacks.
- D. Faceplates shall be manufactured by the same manufacturer as the outlet jacks and shall be compatible with the submitted outlet jacks. Provide “keystone” jacks as necessary.
- E. Acceptable Products:
 - 1. Stainless SG Faceplate. Belden/CDT AX102009.
 - 2. CommScope Systemax M14SP.
 - 3. Or Approved Equal.

2.05 2-PORT SURFACE MOUNTED ENCLOSURES

- A. Provide 2-port side entry box for termination of cabling for wireless access points located above ceilings.
- B. A 25'-0” cable loop shall be provided at all wireless access point locations to allow the workstation outlet to be relocated anywhere in a 25'-0” radius.
- C. Acceptable Products:
 - 1. Belden/CDT 2-Port KeyConnect Side Entry Box P/N AX102652 (White).
 - 2. CommScope Systemax Part Number M102SMB-B-262 (White).
 - 3. Or equal.

2.06 CATEGORY 6 WORKSTATION CORDS

TECHNICAL SPECIFICATIONS

- A. The workstation cords must meet the specific manufacturer system warranty requirements listed in Specification Section 17160 1.06.
- B. Provide (1) 15'-0" category 6 UTP workstation cord for every (2) data drops.
- C. Category 6 Workstation cords shall meet or exceed the requirements of ANSI/TIA/EIA 568-B.2.
- D. Workstation cords should be white, made from stranded conductors and have 8-position RJ-45 style snagless plugs on each end with molded strain relief boots.
- E. Cabling used for workstation cords shall be manufactured by the same manufacturer as the horizontal cabling and shall be of the same product line. Electrical characteristics and performance of the patch cables shall be nearly identical to the horizontal cable with exceptions given due to differences between solid and stranded conductors as indicated in the following table.

Frequency (MHz)	Stranded Conductor Cable Insertion Loss (dB)
1	2.4
4	4.5
8	6.4
10	7.1
16	9.1
20	10.2
25	11.4
31.25	12.8
62.5	18.5
100	23.8
200	34.8
250	39.4

- F. Workstation cords shall be rated for use as communications cable and shall have the designation "CM" or "CMR" printed on the jacket.
- G. Workstation cords shall be identical in construction to the patch cords in the telecommunications rooms. See Specification Section 17110 for patch cord Acceptable Products:
 - 1. Belden/CDT GigaFlex PS6+ Modular Cord P/N AX350047 (15 ft).
 - 2. CommScope Uniprise UNC6 P/N UNC-WH-15F.
 - 3. Or equal.

2.07 VELCRO CABLE STRAPS

- A. Loosely bundle horizontal cabling with Velcro tie wraps.
- B. Velcro tie wraps shall ¾" in width and cut from a continuous roll.

TECHNICAL SPECIFICATIONS

- C. Install Velcro cable ties at 2'-0" intervals outside of the telecom rooms and 1'-0" intervals inside the telecom rooms.
- D. Do not exceed qty (50) cables per bundle.
- E. Acceptable Products
 - 1. Panduit TAK-TY HLSP (plenum).
 - 2. Leviton 43115-075.
 - 3. Or equal.

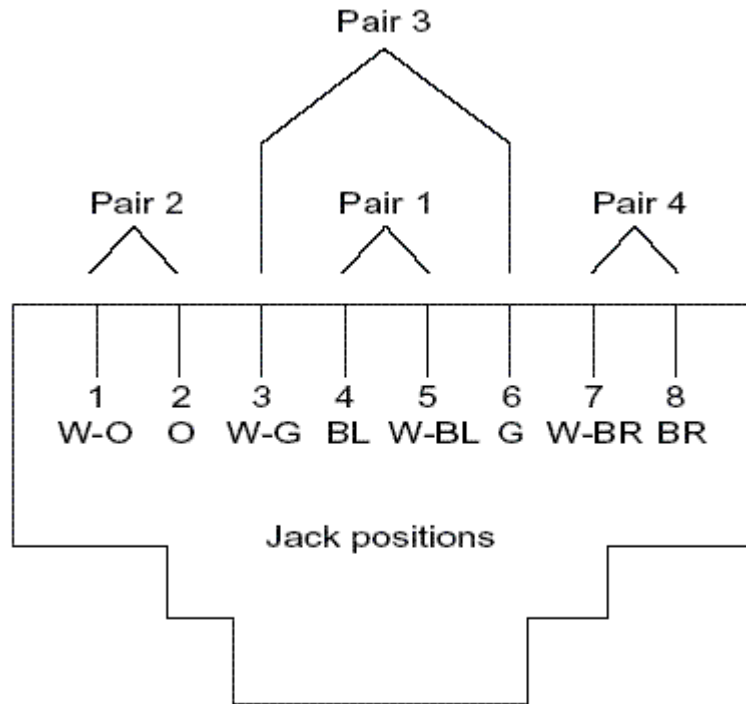
PART 3 EXECUTION

3.01 HORIZONTAL CABLE ROUTING AND TERMINATION

- A. Ten feet of cable slack shall be stored at the telecom room and three feet of cable slack will be provided in the ceiling space above the telecom outlet for each installed cable.
- B. All horizontal cables will be installed in cable bundles. Cable bundles will not exceed 50 cables per bundle and will be loosely bound with velcro straps. Cables in a bundle should be uncombed until entry into each rack's vertical cable management, where the cables are to be combed and dressed together until terminated on each patch panel.
- C. Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points or consolidation points specifically shown on the drawings.
- D. The cable's minimum bend radius and maximum pulling tension shall not be exceeded. Refer to manufacturers requirements and reference documents.
- E. Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, The Contractor shall install appropriate supports to support the cabling.
- F. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the Contractor prior to final acceptance at no cost to the Owner.
- G. Cables shall be labeled with self-adhesive labels. At the work area outlet, the cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate. At the Telecom Room, each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle where the label is obscured from view shall not be acceptable.

TECHNICAL SPECIFICATIONS

- H. Cables shall be installed in accordance with the recommendations made in the ANSI/TIA/EIA-568-B standard document, manufacturer's recommendations and installation guides, and best industry practices.
- I. Plastic "zip-ties" shall not be permitted within the Structured Cabling System. "Velcro" type (hook and loop) tie wraps shall be used for the purpose of bundling / managing horizontal and backbone cabling (must be plenum rated if installed within a plenum space).
- J. Horizontal UTP pair untwist at the termination shall not exceed 0.5".
- K. Jack pin/pair assignments shall be T568B for all installed horizontal cabling unless otherwise specified within the Project Documents.
 - 1. T568B Jack pin/pair assignments are as follows:



- L. For horizontal cabling, if a J-hook System is used to support cable bundles all horizontal cables shall be supported at a maximum of 48" intervals. J-hooks must be secured to a permanent, stable component of the building structure. J-Hooks shall not be attached to wires, cables, etc. The horizontal pathway shall not permit any motion in cabling it supports. Cable quantities shall not exceed J-Hook System manufacturer recommendations or 25 cables, whichever is fewer.
- M. At no point shall cables rest on acoustic ceiling grids or panels, or be attached to any portion of the building accept conduit/innerduct, raceway, ladder rack, cable tray and J-hooks.

TECHNICAL SPECIFICATIONS

- N. Horizontal Category 6 distribution cables shall be bundled or distributed together in groups of no more than 50 cables. When larger quantities are distributed together in ladder rack or cable tray, cables shall be separated into groups of fifty or fewer cables with a minimum of two inches of separation maintained between them at all points.
- O. The cable length between the work area outlet and the termination in the telecommunications closet shall not exceed 295 feet. Any horizontal cable runs longer than 295 feet should be brought to the immediate attention of the Owner's Representative prior to installation.
- P. When placing cable, the Contractor shall maintain the following minimum clearance from sources of electro-magnetic interference (EMI).
 - 1. 6" clear from power conductors.
 - 2. 12" clear from fluorescent lighting fixtures and ballasts.
 - 3. 36" clear from transformers and motors.

3.02 WORK AREA OUTLETS

- A. Work Area outlets and connectors shall be installed in accordance with manufacturer's recommendations and installation guides, and best industry practices.
- B. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA/EIA-568-B standard document, manufacturer's recommendations and best industry practices.
- C. Pair untwist at the termination shall not exceed 0.5".
- D. Bend radius of the cable in the termination area shall not be less than 4 times the outside diameter of the cable.

END OF SECTION 17160

TECHNICAL SPECIFICATIONS

SECTION 17170 TESTING AND IDENTIFICATION

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. Drawings and general provisions of the Contract, Including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.
- B. The Contractor shall provide all equipment, materials, labor, and services necessary to complete the testing, labeling and documentation of the telecom cabling system in compliance with requirements stated or reasonably inferred by the Specifications and the Contract Drawings.
- C. This section includes the minimum requirements for the testing, identification and administration for the telecommunications cabling system, including the following:
 - 1. Testing
 - a. Category 6 Cable Test Equipment and Test Procedures.
 - b. Fiber optic cable test equipment and test procedures.
 - c. Cable test reports.
 - 2. Identification
 - a. Labeling of work area outlet faceplates and jacks.
 - b. Labeling of horizontal data, voice and video cabling.
 - c. Labeling of Copper Patch Panels.
 - d. Labeling of fiber optic patch panels.
 - e. Labeling of 110 wiring blocks.
 - f. Labeling of copper and fiber patch cables.
 - g. Labeling of racks and cabinets.
 - h. Labeling of copper and fiber backbone cable.
 - i. Label of copper & fiber splice enclosures.
 - j. Labeling of innerduct.
 - k. Labeling of ground bars and ground conductors.
 - 3. Administration
 - a. As-built drawings.
 - b. Materials listing.
 - c. Voice and data termination spreadsheet.
 - d. Laminated termination spreadsheets in each telecom room.

1.02 REGULATIONS AND CODE COMPLIANCE

- A. Materials and work specified herein shall comply with the requirements of Specification Section 17010 1.04 and in particular the following code requirements

TECHNICAL SPECIFICATIONS

1. ANSI/TIA-568-C.0 – Generic Telecommunications Cabling for Customer Premises.
2. ANSI/TIA-568-C.1 – Commercial Building Telecommunications Cabling Standard.
3. ANSI/TIA-568-C.2 – Balanced Twisted-Pair Telecommunication Cabling and Components Standard.
4. ANSI/TIA-568-C.3 – Optical Fiber Cabling Components Standard.
5. ANSI/TIA-606-A -- The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
6. Underwriter's Laboratories, Inc. (UL).

1.03 SUBMITTALS

- A. Test Equipment: Submit manufacturers' catalog sheets and specifications for the following cable testers
 1. Category 6 cable tester.
 2. Multimode and singlemode fiber optic cable tester.
- B. Calibration Reports: Provide calibration reports for all test equipment to be used on the Project. The calibration must have been performed by a manufacturer certified calibration facility and be dated no more than 60 days prior to the start of testing.
- C. Cable Test Reports: Provide bound test reports for all cables signed by the technician performing the cable testing. Include Manufacturers data sheets for the cabling being tested.
- D. Labels: Submit manufacturer's data sheets on the type of labels to be used for each labeling application.
- E. Sample Cable Termination Spreadsheet: Submit a sample cable termination spreadsheet (in Microsoft Excel format).

PART 2 PRODUCTS

2.01 HORIZONTAL CATEGORY 6 UNSHIELDED TWISTED-PAIR CABLE TESTER

- A. Shall perform all tests necessary to certify the horizontal Category 6 UTP cabling in accordance with ANSI/TIA/EIA 568 B.2-1.
- B. Shall be a UL certified Level III test set calibrated by a manufacturer certified calibration facility. The calibration shall be dated no more than 60 days prior to the start of testing.
- C. Acceptable Manufacturers
 1. Fluke Networks
 2. Ideal Industries
 3. Agilent Technologies
 4. Or equal.

TECHNICAL SPECIFICATIONS

2.02 OPTICAL FIBER CABLE TESTERS

- A. The Contractor shall test all strands of optical fiber cable with an approved power meter and light source. OTDR Trace results to be provided on all fiber strands.
- B. The tester shall be capable of performing the tests required by ANSI/TIA/EIA – 568-B.1, ANSI/TIA/EIA–526-14A, and ANSI/TIA/EIA–526-7.
- C. The tester shall have been calibrated by a manufacturer certified calibration facility. The calibration shall be dated no more than 60 days prior to the start of testing.
- D. Acceptable Manufacturers
 - 1. Fluke Networks
 - 2. Ideal Industries
 - 3. Agilent Technologies
 - 4. Or equal.

2.03 LABELS

- A. Labels shall be laser printed and shall meet the legibility, defacement, exposure and adhesion requirements of UL 969.
- B. Acceptable manufacturers
 - 1. Brother
 - 2. Ideal
 - 3. Panduit
 - 4. W.H. Brady
 - 5. Or equal

2.04 WORK AREA OUTLET FACEPLATE LABELS

- A. Label each port in each faceplate in accordance with Labeling Scheme identified on the Drawings. Label must be machine printed and inserted in the faceplate label window. Labels shall be provided by the faceplate manufacturer (Belden/CDT, CommScope Systimax, or equal).

2.05 HORIZONTAL CABLE SHEATH LABELS

- A. Label horizontal cable sheaths at work area outlets and at patch panels with laser printed self laminating wrap around vinyl labels. Labels shall be in accordance with the Labeling Scheme identified on the drawings.
- B. Labels shall be white with black type. Label size shall be 1.0" wide by 1.5" high.
- C. At the Telecom Room, cable labels will be affixed to cable a minimum of 1 inch from the termination on the patch panel, and placed in such a way as to be clearly visible.

TECHNICAL SPECIFICATIONS

D. At the work area outlet, cable labels shall be affixed to the cable 2 inches from the termination on the jack.

1. Acceptable Manufacturers:

- a. Brady.
- b. Belden.
- c. Hellermann Tyton.
- d. Or equal.

2.06 COPPER PATCH PANEL LABELS.

A. Label each patch panel with a single panel ID label in accordance with the labeling scheme identified on the drawings.

B. Labels shall be compatible with the patch panels provided for the Project.

C. Label material shall be permanent polyester. Labels shall be white with black type. Label size shall be 0.5" wide by 0.5" high.

1. Acceptable Manufacturers:

- a. Brady.
- b. Belden.
- c. Hellermann Tyton.
- d. Or equal.

D. Label each patch panel port with a laser printed label. Label each port with the room number of the room housing the work area outlet.

E. Labels shall be compatible with the patch panels provided for the Project.

F. Label material shall be permanent polyester. Labels shall be white with black type. Label size shall be 0.375" high.

1. Acceptable Manufacturers:

- a. Brady.
- b. Belden.
- c. Hellermann Tyton.
- d. Or equal.

2.07 TELECOM ROOM FIBER OPTIC TERMINATION CABINET LABELS

A. Label each fiber optic patch panel with a single panel ID label in accordance with the labeling scheme identified on the drawings.

B. Label material shall be permanent polyester. Labels shall be white with black type. Label size shall be 0.5" wide by 0.5" high.

1. Acceptable Manufacturers:

TECHNICAL SPECIFICATIONS

- a. Brady.
 - b. Belden.
 - c. Hellermann Tyton.
 - d. Or equal.
- C. A label will be affixed to the FiberExpress chassis for each Optical Fiber Adapter Strip as shown using the Backbone Cable Labeling Scheme.
- D. Label material shall be permanent polyester. Labels shall be white with black type. Label size shall be 0.5" high.
- 1. Acceptable Manufacturers:
 - a. Brady.
 - b. Belden.
 - c. Hellermann Tyton.
 - d. Or equal.

2.08 EQUIPMENT ROOM FIBER OPTIC TERMINATION CABINET LABELS

- A. Label each FiberExpress chassis in accordance with the labeling scheme identified on the drawings. Label with a single panel ID label.
- B. Label material shall be permanent polyester. Labels shall be white with black type. Label size shall be 0.5" wide by 0.5" high.
- 1. Acceptable Manufacturers:
 - a. Brady.
 - b. Belden.
 - c. Hellermann Tyton.
 - d. Or equal.
- C. Label fiber modules in accordance with the labeling scheme identified on the drawings. Labels shall be affixed to the FiberExpress Manager chassis directly on the Plexiglas front cover so labels will be visible when the cover is closed. Place labels below each set of two Connector Modules. Each label will be representative of one Connector Module and will indicate the exact location and position of the cable's far end according to the Backbone Cable Labeling Scheme.
- E. Label material shall be permanent polyester. Labels shall be white with black type. Label size shall be 0.5" high.
- 1. Acceptable Manufacturers:
 - a. Brady.
 - b. Belden.
 - c. Hellermann Tyton.

TECHNICAL SPECIFICATIONS

- d. Or equal.
- F. Label each Connector Module with its Slot in accordance with the labeling scheme identified on the drawings.
- G. Label material shall be permanent polyester. Labels shall be white with black type. Label size shall be 0.5" wide by 0.5" high.
 - 1. Acceptable Manufacturers:
 - a. Brady.
 - b. Belden.
 - c. Hellermann Tyton.
 - d. Or equal.

2.09 EQUIPMENT RACK LABELS

- A. Provide labels on the top angle of all equipment racks. Labels shall in accordance with the labeling scheme identified on the drawings.
- B. Racks shall be labeled with Space ID and Rack ID.
- C. Label material shall be permanent polyester. Labels shall be white with black type. Label size shall be 1.0" high.
 - 1. Acceptable Manufacturers:
 - e. Brady.
 - f. Belden.
 - g. Hellermann Tyton.
 - h. Or equal.

2.10 COPPER BACKBONE CABLE SHEATH LABELS

- A. The backbone cable sheaths in the Telecom rooms and at pull boxes shall be labeled. Labels shall be in accordance with the labeling scheme identified on the drawings.
- B. Labels must be clearly visible at the rear of the rack.
- C. Labels shall be self-laminating vinyl labels and must be compatible with the diameter of the backbone cable. Labels shall be 2.5" high by 1.5" wide.
 - 2. Acceptable Manufacturers:
 - a. Brady.
 - b. Belden.
 - c. Hellermann Tyton.
 - d. Or equal.

PART 3 EXECUTION

TECHNICAL SPECIFICATIONS

3.01 CABLE TESTING – GENERAL

- A. Visually inspect all cables, cable reels, and shipping cartons to detect cable damage incurred during shipping and transport. Return visibly damaged items to the manufacturer.
- B. Where post-manufacture test data has been provided by the manufacturer on the reel or shipping carton, submit copies to the Owner's Representative as part of the cable test results.
- C. The Owner's Representative reserves the right to observe any or all portions of the cable testing process.
- D. The Owner's Representative further reserves the right to conduct, using contractors equipment and labor, a random re-test of up to thirty percent (30%) of the cable plant to confirm documented test results.
- E. Test results and corrective procedures are to be documented and submitted to the Owner's Representative within five (5) working days of test completion.

3.02 CATEGORY 6 UTP CABLE TESTING

- A. A representative of the end-user shall be invited to witness field testing. The representative shall be notified of the start date of the testing phase 5 business days before testing commences.
- B. Field test measurements shall be made in accordance with Annex I of ANSI/TIA/EIA-568-B.2 unless otherwise noted.
- C. Field test measurements shall be conducted from 1 MHz to 250 MHz.
- D. Field testing shall be conducted using a level III tester. The accuracy of the level III tester shall meet or exceed the requirements of Annex B of ANSI/TIA/EIA-568-B.2-1. The tester shall be within the calibration period recommended by the vendor in order to achieve the vendor-specified measurement accuracy.
- E. Every cabling link shall be tested in accordance with the ANSI/TIA/EIA-568-B.1 Section 11.2: "100-Ohm twisted-pair transmission performance and field test requirements".
- F. The installed twisted-pair horizontal links shall be tested from the patch panel in the telecommunications room to the work area outlet. The cable must pass the "Permanent Link" performance limits specification as defined in ANSI/TIA/EIA-568-B.1.
- G. 100% of the installed cabling links must be tested and must pass the requirements of the standards mentioned above. Any failing link must be diagnosed and corrected. The corrective action shall be followed with a new test to prove that the corrected link meets the performance requirements. The final and passing result of the tests for all links shall be provided in the test results documentation.

TECHNICAL SPECIFICATIONS

- H. Trained technicians who have successfully attended an appropriate training program shall execute the tests. Appropriate training programs include but are not limited to installation certification programs provided by BICSI or the ACP (Association of Cabling Professionals).
- I. A Pass or Fail result for each parameter is determined by comparing the measured values with the specified test limits for that parameter. The test result of a parameter shall be marked with an asterisk (*) when the result is closer to the test limit than the accuracy of the field tester. The field tester manufacturer must provide documentation as an aid to interpret results marked with asterisks. (Reference TIA-568-B; Annex I: Section I.2.2).
- J. The Contractor shall provide Category 6, 250 MHz channel test results on all pairs of cable. The following minimum field test parameters are required:
 - 1. Wire map (including cable shield if present).
 - 2. Length.
 - 3. Insertion loss.
 - 4. Near-end crosstalk (NEXT) loss.
 - 5. Power sum near-end crosstalk (PSNEXT) loss.
 - 6. Equal-level far-end crosstalk (ELFEXT).
 - 7. Power-sum equal-level far-end crosstalk (PSELFEXT).
 - 8. Return loss.
 - 9. Propagation delay.
 - 10. Delay skew.
- K. Test results shall be provided in electronic format and printed 8.5" x 11" format signed by the technician performing the testing. The electronic format should be a Microsoft Word .doc file. Along with the above test parameters, the following information must be included for each cable tested:
 - 1. Name of Owner and name of project (building name).
 - 2. Date and time of test.
 - 3. Name of technician performing the field testing.
 - 4. Manufacturer, model number, serial number and software revision of field tester.
 - 5. Cable ID (Telecom Room # - Patch Panel # - Port # / Work Area Room # - Telecom Outlet – Jack #).
 - 6. Overall Pass/Fail result.
 - 7. Manufacturer, category and model number of cable.
 - 8. NVP used to determine cable length.

3.03 OPTICAL FIBER CABLE TESTING

- A. A representative of the end-user shall be invited to witness field testing. The representative shall be notified of the start date of the testing phase 5 business days before testing commences.
- B. 100% of the installed cabling links must be tested and must pass the field test specifications defined by the Telecommunications Industry Association (TIA) standard ANSI/TIA/EIA-568-B.1, ANSI/TIA/EIA-568-B.3 and ANSI/TIE/EIA-568-

TECHNICAL SPECIFICATIONS

C.0. Any failing link must be diagnosed and corrected. The corrective action shall be followed with a new test to prove that the corrected link meets the performance requirements. The final and passing result of the tests for all links shall be provided in the test results documentation.

- C. Trained technicians who have successfully attended an appropriate training program and have obtained a certificate as proof thereof shall execute the tests. These certificates may have been issued by any of the following organizations or an equivalent organization:
1. The manufacturer of the fiber optic cable and/or the fiber optic connectors.
 2. The manufacturer of the test equipment used for the field certification tests.
 3. Training organizations authorized by BICSI or by the ACP (Association of Cabling Professionals™) Cabling Business Institute.
- D. Field test instruments for multimode fiber cabling shall meet the requirements of ANSI/TIA/EIA-526-14A. The light source shall meet the launch requirements of ANSI/EIA/TIA-455-50B, Method A. This launch condition can be achieved either within the field test equipment or by use of an external mandrel wrap (as described in clause 11 of ANSI/TIA/EIA-568-B.1) with a Category 1 light source. Field test instruments for singlemode fiber cabling shall meet the requirements of ANSI/EIA/TIA-526-7.
- E. The tester shall be within the calibration period recommended by the vendor in order to achieve the vendor-specified measurement accuracy.
- F. The fiber optic launch cables and adapters must be of high quality and the cables shall not show excessive wear resulting from repetitive coiling and storing of the tester interface adapters.
- G. A Pass or Fail result for each parameter is determined by comparing the measured values with the specified test limits for that parameter.
- H. Performance Test Parameters:
1. The multimode backbone links shall be tested in one direction at 850 nm and 1300 nm in accordance with ANSI/EIA/TIA-526-14A.
 2. Singlemode backbone links shall be tested at 1310 nm and 1550 nm in accordance with ANSI/TIA/EIA-526-7, Method A.1, One Reference Jumper or equivalent method.
 3. The link attenuation shall be calculated by the following formulas specified in ANSI/TIA/EIA standard 568-C.

Link Attenuation = Cable Attenuation + Connector Insertion Loss + Splice Insertion Loss

Where:

Cable Attenuation(dB) = Attenuation Coefficient(dB/Km) x Length(km)

TECHNICAL SPECIFICATIONS

Connector Insertion Loss(dB) = # of connector pairs x connector loss(dB)

Splice Insertion loss(dB) = # of splices(S) x splice loss(dB)

The values for the Attenuation Coefficient are listed in the following table below:

Type of Optical Fiber	Wavelength (nm)	Attenuation Coefficient (dB/km)
Multimode 50/125 um	850	3.5
Multimode 50/125 um	1300	1.5
Single Mode	1310	0.5
Single Mode	1550	0.5

4. The maximum allowable connector insertion loss = 0.75 dB. The maximum allowable splice loss = 0.3 dB.
- I. The Contractor shall test all fiber optic cables and provide test results in electronic format and printed 8.5" x 11" format signed by the technician performing the testing. The electronic format should be a Microsoft Word .doc file. The following field test documentation shall be provided for each fiber optic strand:
 1. Wavelength of test (850 nm or 1300 nm for Multimode and 1310 nm or 1550 nm for Singlemode)
 2. Length of segment.
 3. Number of splices.
 4. Link attenuation (for each wavelength).
 5. Overall Pass/Fail result.
 6. Margin by which the strand passed the test (difference between the allowable link attenuation and the measured link attenuation).
 7. Name of Owner and name of project (building name).
 8. Date and time of test.
 9. Name of technician performing the field testing.
 10. Manufacturer, model number, serial number and software revision of field tester.
 11. Cable ID (Telecom Room # - Patch Panel # - Port # / Telecom Room # - Patch Panel # - Port #. Telecom Outlet – Jack #).
 12. Manufacturer, model number of cable, type of cable and strand count.

3.04 CABLE TESTING VALIDATION

- A. To validate the testing and associated results, the Contractor shall participate in cable testing validation.
- B. After the Contractor has completed all cable testing and submitted test results, the Contractor shall, in the presence of the Owner's Representative, test up to 5% of the installed and tested cables (random sample to be selected by the Owner's Representative).

3.05 IDENTIFICATION AND LABELING

TECHNICAL SPECIFICATIONS

- A. The Contractor shall confirm the telecom room and work area room numbers with the Owner or Owner's Representative prior to labeling.
- B. Work Area Outlet Face Plates: Label all faceplates in sequential order in a clockwise manner from the main entrance of the room containing the cable drops starting with the number one "1". This numbering scheme will reset in each room. For example, Telecom Outlet 2 in Room 102 = "102-2".
- C. Work Area Data and Voice Jacks: Each data and voice jack at the work area outlet shall be labeled. The label shall identify the name of the telecom room from which the drop originated, the letter of the patch panel where the drop is terminated and the patch panel port number. For example, Telecom Room "150", Patch Panel "B", Patch Panel Port 48 = "150-B-48".
- D. Work Area Horizontal Data, Voice and Video Cable: Horizontal cable should be labeled at both ends within 6" of the point of termination. At the workstation outlet, the label shall identify the name of the telecom room from which the drop originated, the letter of the patch panel where the drop is terminated and the patch panel port number. For example, Telecom Room "150", Patch Panel "B", Patch Panel Port 48 = "150-B-48".
- E. Telecom Room Horizontal Data, Voice and Video Cable: At the patch panel, the label shall identify the name of the room in which the drop is terminated, the Outlet number in the room, and the jack number within the telecom outlet plate. For example, Room 102, Telecom Outlet 2, Jack 3 = "102-2-3".
- F. Patch Panels: Each patch panel in the telecom room shall have an alpha label (A-Z) located on the left hand side of the panel. Patch panel "A" shall be located at the top of the first rack in the telecommunications room. Patch panels beneath patch panel "A" shall be labeled B, C, etc. If additional patch panels are present in additional racks in the wiring closet, the patch panels adjacent to the left-most rack (when facing the racks) shall continue the sequential labeling beginning with the patch panel at the top of the next rack. The lettering scheme will reset in each telecom room. For example, Telecom Room 150, Rack 1, Patch Panel B = "B".
- G. Patch Panel Ports: Each port shall be labeled with the name of the room in which the drop is terminated, the outlet number in the room, and the jack number within the telecom outlet plate. For example, Room 102, Telecom Outlet 2, Jack 3 = "102-2-3".
- H. Fiber Termination Cabinets: Each termination cabinet in the telecom rooms shall have an alpha label (A-Z) located on the left hand side of the cabinet. Termination cabinet "A" shall be located at the top of the first rack in the telecommunications room. Termination cabinets beneath cabinet "A" shall be labeled B, C, etc. If additional cabinets are present in additional racks in the telecom room, the cabinets adjacent to the left-most rack (when facing the racks) shall continue the sequential labeling beginning with the cabinet at the top of the next rack. The lettering scheme will reset in each telecom room. For example, Telecom Room 150, Rack 2, Fiber Patch Panel A = "A".
- I. Fiber Termination Cabinet Ports: Each port shall be labeled with the name of the telecom room in which the opposite end of the strand is terminated, the letter of

TECHNICAL SPECIFICATIONS

the termination cabinet and the port number. For example, telecom room 150, Fiber Patch Panel A, port 10 = "150-A-10".

- J. Backbone Cables: Backbone cables shall be marked at each endpoint and at all intermediate pull/access points, junction boxes or splices. Labels shall indicate origination and destination telecommunications rooms, the pair count and the type of cable (U=UTP, MM=Multimode, SM=Singlemode). For example, 200-pair copper cable from the MDF to telecom room 150 = "MDF-150-200PR-U".
- K. Equipment Racks and Cabinets: Open racks shall be labeled on the top angle. Cabinets shall be labeled at the top of the door. Racks and cabinets shall be numbered sequentially within in each telecom room starting with the number 1. The numbering scheme will reset in each telecom room. Rack 1 will be located in the 1st rack row adjacent to the wall. For example, telecom Room 150, 1st Rack = "RACK 1".

3.06 ADMINISTRATION

A. As-Built Drawings.

- 1. The Contractor shall provide As-Built drawings at the end of the project. One (1) reproducible and (1) blue line shall be provided. Electronic versions of the drawings in AutoCAD version 2000/2002 shall also be provided. The following information shall be provided on the As-Built Drawings:

- a. Plan location of all telecom outlets.
- b. Quantity and type of drops at each telecom outlet.
- c. Telecom room where the drops are terminated.
- d. Cable tray layout. Provide dimensions from building grid lines to locate cable tray.
- e. J-hook layout. Provide dimensions from building grid lines to locate J-hook runs.
- f. Conduits and pull box layout. Provide dimensions from building grid lines to locate conduits and pull boxes.
- g. Backbone cable runs and pair/strand counts.
- h. Horizontal and vertical sleeve layout.
- i. Outside plant vaults and pull boxes. Provide dimensions from curbs to locate vaults and pull boxes.
- j. Outside plant conduits. Provide dimensions from curbs to locate conduit.

B. Materials Listing

- 1. The contractor shall provide a spreadsheet indicating the materials and quantities used on the project. At a minimum, the spreadsheet will contain the following information: Item description, manufacturer, part number, quantity and color (where applicable).

TECHNICAL SPECIFICATIONS

END OF SECTION 17170



nevada

Office of the Labor Commissioner



2014 PREVAILING WAGE RATES CARSON CITY

DATE OF DETERMINATION: October 1, 2013

APPLICABLE FOR PUBLIC WORKS PROJECTS BID/AWARDED
OCTOBER 1, 2013 THROUGH SEPTEMBER 30, 2014*

***Pursuant to NAC 338.040(3), "After a contract has been awarded, the prevailing rates of wages in effect at the time of the opening of bids remain in effect for the duration of the project."**

As Amendments/Addenda are made to the wage rates, such will be posted to sites of the respective counties. Please review regularly for any amendments posted or contact our offices directly for further assistance with any amendments to the rates.

[AIR BALANCE TECHNICIAN](#)

[ALARM INSTALLER](#)

[BOILERMAKER](#)

[BRICKLAYER](#)

[CARPENTER](#)

[CEMENT MASON](#)

[ELECTRICIAN-COMMUNICATION TECH.](#)

[ELECTRICIAN-LINE](#)

[ELECTRICIAN-NEON SIGN](#)

[ELECTRICIAN-WIREMAN](#)

[ELEVATOR CONSTRUCTOR](#)

[FENCE ERECTOR](#)

[FLAGPERSON](#)

[FLOOR COVERER](#)

2013-2014 Prevailing Wage Rates – Carson City County

ATTACHMENT A

[GLAZIER](#)
[HIGHWAY STRIPER](#)
[HOD CARRIER-BRICK MASON](#)
[HOD CARRIER-PLASTERER TENDER](#)
[IRON WORKER](#)
[LABORER](#)
[MECHANICAL INSULATOR](#)
[MILLWRIGHT](#)
[OPERATING ENGINEER](#)
[OPERATING ENG. STEEL FABRICATOR/ERECTOR](#)
[OPERATING ENGINEER-PILEDRIIVER](#)
[PAINTER](#)
[PILEDRIIVER \(NON-EQUIPMENT\)](#)
[PLASTERER](#)
[PLUMBER/PIPEFITTER](#)
[REFRIGERATION](#)
[ROOFER \(Does not include sheet metal roofs\)](#)
[SHEET METAL WORKER](#)
[SPRINKLER FITTER](#)
[SURVEYOR \(NON-LICENSED\)](#)
[TAPER](#)
[TILE /TERRAZZO WORKER/MARBLE MASON](#)
[TRAFFIC BARRIER ERECTOR](#)
[TRUCK DRIVER](#)
[WELL DRILLER](#)
[LUBRICATION AND SERVICE ENGINEER \(MOBILE AND GREASE RACK\)](#)
[SOIL TESTER \(CERTIFIED\)](#)
[SOILS AND MATERIALS TESTER](#)

**PREVAILING WAGE RATES INCLUDE THE BASE RATE AS WELL AS ALL
APPLICABLE FRINGES**

NRS 338.010(21) “Wages” means:

- (a) The basic hourly rate of pay; and
- (b) The amount of pension, health and welfare, vacation and holiday pay, the cost of apprenticeship training or other similar programs or other bona fide fringe benefits which are a benefit to the workman.

NRS 338.035 Discharge of part of obligation of contractor or subcontractor engaged on public work to pay wages by making certain contributions in name of workman. The obligation of a contractor engaged on a public work or a subcontractor engaged on a public work to pay wages in accordance with the determination of the Labor Commissioner may be discharged in part by making contributions to a third person pursuant to a fund, plan or program in the name of the workman.

2013-2014 Prevailing Wage Rates – Carson City County

ATTACHMENT A

CRAFT

RATE

AIR BALANCE TECHNICIAN

ADD SHEET METAL ZONE RATE

Air Balance-Journeyman	51.24
Air Balance-Foreman	54.10
Air Balance-General Foreman	56.97

ALARM INSTALLER

Alarm Installer-Journeyman	31.37
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BOILERMAKER

Boilermaker	65.94
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BRICKLAYER

ADD ZONE RATE

Bricklayer-Journeyman	34.78
Bricklayer-Foreman	36.03
Bricklayer-General Foreman	37.78

CARPENTER

ADD ZONE RATE

Carpenter-Journeyman	39.55
Carpenter-Foreman	42.30

CEMENT MASON

ADD ZONE RATE

Cement Mason-Journeyman	35.40
Cement Mason-Foreman	37.65

**ELECTRICIAN COMMUNICATION
TECHNICIAN**

ADD ZONE RATE

Communication Technician-Installer	31.37
Communication Technician	34.68
Communication-Senior Technician	37.25

ELECTRICIAN-LINE

Electrician-Groundman	43.95
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2013-2014 Prevailing Wage Rates – Carson City County

ATTACHMENT A

Electrician-Lineman	65.03
Electrician-Foreman	70.71
Electrician-General Foreman	76.44
Heavy Equipment Operator	53.75

ELECTRICIAN-NEON SIGN

Electrician-Neon Sign	47.28
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ELECTRICIAN-WIREMAN

Wireman	51.62	<u>ADD ZONE RATE</u>
Cable Splicer	55.43	
Wireman-Foreman	55.43	
Wireman-General Foreman	59.24	

ELEVATOR CONSTRUCTOR

Elevator Constructor-Journeyman Mechanic	87.91
Elevator Constructor-Mechanic in Charge	95.74

FENCE ERECTOR

Fence Erector	42.57
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FLAGPERSON

Flagperson	28.70	<u>ADD LABORER ZONE RATE</u>
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FLOOR COVERER

Floor Coverer-Journeyman	36.89
Floor Coverer-Foreman	39.43

GLAZIER

Glazier	19.50
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HIGHWAY STRIPER

Highway Striper	34.32	<u>ADD LABORER ZONE RATE</u>
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2013-2014 Prevailing Wage Rates – Carson City County

ATTACHMENT A

HOD CARRIER-BRICK MASON TENDER [ADD ZONE RATE](#)

Brick Mason-Journeyman	30.47
Brick Mason-Foreman	30.97

HOD CARRIER-PLASTER TENDER [ADD ZONE RATE](#)

Plasterer Tender-Journeyman	35.01
Plasterer-Gun Tender	36.01
Plasterer Tender-Foreman	36.37

IRON WORKER

Ironworker-Journeyman	59.30
Ironworker-Foreman	62.60
Ironworker-General Foreman	66.23

LABORER

SEE [GROUP CLASSIFICATIONS](#) [ADD ZONE RATE](#)

Landscaper	26.41
Furniture Mover	27.91
Group 1	31.57
Group 1A	28.70
Group 2	31.67
Group 3	31.82
Group 4	32.07
Group 4A	33.32
Group 5	32.37
Group 6	
Nozzlemen, Rodmen	32.37
Gunmen, Materialmen	32.07
Reboundmen	31.72
Gunite Foremen	32.77

MECHANICAL INSULATOR [ADD ZONE RATE](#)

Mechanical Insulator-Mechanic	58.43
Mechanical Insulator-Foreman	61.71

2013-2014 Prevailing Wage Rates – Carson City County

ATTACHMENT A

Mechanical Insulator-General Foreman 64.99

MILLWRIGHT ADD ZONE RATE

Millwright 53.26

OPERATING ENGINEER ADD ZONE RATE
SEE GROUP CLASSIFICATIONS

Group 1 44.74
Group 1A 47.50
Group 2 48.03
Group 3 48.30
Group 4 49.04
Group 5 49.34
Group 6 49.51
Group 7 49.76
Group 8 50.35
Group 9 50.67
Group 10 51.02
Group 10A 51.21
Group 11 51.47
Group 11A 53.09
Group 11B 53.90

Foreman

Add 7% to base rate for "Second" Shift

Add 12.5% to base rate for "Special" shift

OPERATING ENGINEER-STEEL ADD ZONE RATE
FABRICATOR & ERECTOR
SEE GROUP CLASSIFICATIONS

Group 1 60.04
Group 1 Truck Crane Oiler 53.87
Group 1 Oiler 51.91
Group 2 58.53
Group 2 Truck Crane Oiler 53.62

2013-2014 Prevailing Wage Rates – Carson City County

ATTACHMENT A

Group 2 Oiler	51.70
Group 3	57.29
Group 3 Truck Crane Oiler	53.40
Group 3 Oiler	51.48
Group 3 Hydraulic	53.07
Group 4	55.56
Group 5	54.46
Add 7% to base rate for "Second" Shift	
Add 12.5% to base rate for "Special" Shift	

OPERATING ENGINEER - PILEDRIVER
SEE GROUP CLASSIFICATIONS

ADD ZONE RATE

Group 1	59.51
Group 1 Truck Crane Oiler	54.05
Group 1 Oiler	52.13
Group 2	57.97
Group 2 Truck Crane Oiler	53.84
Group 2 Oiler	51.93
Group 3	56.52
Group 3 Truck Crane Oiler	53.62
Group 3 Oiler	51.70
Group 4	55.01
Group 5	53.90
Group 6	52.79
Group 7	51.83
Group 8	50.87
Add 7% to base for "Second" Shift	
Add 12.5% to base for "Special" Shift	

PAINTER

Brush/Roller Painter	33.49
Spray Painter/Paperhanger	34.34
Sandblaster	34.84

2013-2014 Prevailing Wage Rates – Carson City County

ATTACHMENT A

Structural Steel & Steeplejack	35.34
Swing Stage	36.34
Special Coating Application-Brush	34.84
Special Coating Application-Spray	35.34
Special Coating Application-Spray Steel	35.59
Foreman	\$1.00 above highest Journeyman

PILEDRIVER

Piledriver-Journeyman	50.80
Piledriver-Foreman	40.30

PLASTERER

ADD ZONE RATE

Plasterer-Journeyman	36.37
Plasterer-Foreman	38.62

PLUMBER/PIPEFITTER

Plumber-Journeyman	45.20
Plumber-Foreman	48.16
Plumber-General Foreman	51.11

REFRIGERATION

Refrigeration-Journeyman	34.89
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ROOFER (Does not include sheet metal roofs)

Rofer	20.45
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SHEET METAL WORKER

ADD ZONE RATE

Sheet Metal-Journeyman	51.24
Sheet Metal-Foreman	54.10
Sheet Metal-General Foreman	56.97

SPRINKLER FITTER

Sprinkler Fitter-Journeyman	58.42
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2013-2014 Prevailing Wage Rates – Carson City County

ATTACHMENT A

Sprinkler Fitter-Foreman	60.97
Sprinkler Fitter-General Foreman	63.42
SURVEYOR	<u>ADD ZONE RATE</u>
Surveyor	48.36
TAPER	
Taper	38.16
TILE SETTER/TERRAZZO WORKER/MARBLE MASON-FINISHER	
Tile, Terrazzo and Marble Finisher	26.37
TILE SETTER/TERRAZZO WORKER/MARBLE MASON	<u>ADD ZONE RATE</u>
Tile Setter-Journeyman	34.67
Tile Setter-Foreman	35.92
Tile Setter-General Foreman	37.67
Terrazzo/Marble Mason-Journeyman	36.17
Terrazzo/Marble Mason-Foreman	37.42
Terrazzo/Marble Mason-General Foreman	39.17
TRAFFIC BARRIER ERECTOR	<u>ADD LABORER ZONE RATE</u>
Traffic Barrier Erector	31.57
TRUCK DRIVER	
Truck Driver	20.80
WELL DRILLER	
Well Driller	30.82
LUBRICATION AND SERVICE ENGINEER (MOBILE AND GREASE RACK)	<u>ADD OPERATING ENG. ZONE RATE</u>
Lubrication and Service Engineer (mobile and grease rack)	49.51

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SOIL TESTER (CERTIFIED)

Soil Tester (Certified)	60.59
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SOILS AND MATERIALS TESTER

Soils and Materials Tester	60.59
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Job Descriptions for Recognized Classes of Workmen

Regarding job descriptions for public works projects, please take notice of the following:

1. Pursuant to NAC 338.0095(1)(a), "A workman employed on a public work must be paid based on the type of work that the workman actually performs on the public work and in accordance with the recognized class of the workman."
2. The work description for a particular class is not intended to be jurisdictional in scope nor to be construed as limiting or prohibiting any worker from performing the work of one or more classes.
3. Any person who believes that a type of work is not classified, or who otherwise needs clarification pertaining to the recognized classes or job descriptions, shall contact the Labor Commissioner, in writing, for a determination of the applicable classification and pay rate for a particular type of work.
4. The job descriptions set forth or referenced herein supersede any and all descriptions previously agreed upon by the Labor Commissioner in any settlement agreements or stipulations arising out of contested matters.
5. The following specific provisions, where applicable, shall prevail over any general provisions of the job descriptions:
 - Amendments to the prevailing wage determinations;
 - Group Classifications and/or descriptions recognized by the Labor Commissioner and included with wage determinations for a particular type of work in a particular county.

AIR BALANCE TECHNICIAN, includes but is not limited to:

Inspecting, testing, programming, documenting, adjusting and balancing heating, cooling and ventilating systems using specialized tools and testing equipment to attain performance standards specified in the design of the systems.

ALARM INSTALLER, includes but is not limited to:

1. Installing or testing electrical protective signaling systems used to provide notification of fire, burglary or other irregularities on the premises of the subscriber of the system;
2. Installing of wiring and signaling units;
3. Repairing electrical protective signaling systems
4. Starting up, programming and documenting systems;

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BOILERMAKER, includes but is not limited to:

1. Constructing, assembling, maintaining and repairing stationary steam boilers and boiler house auxiliaries;
2. Aligning structures or plate sections to assemble boiler frame tanks or vats;
3. Assisting in the testing of assembled vessels, directing cleaning of boilers and boiler furnaces;
4. Inspecting and repairing boiler fittings, including, without limitation, safety valves, regulators, automatic-control mechanisms, water columns and auxiliary machines.

BRICKLAYER, includes but is not limited to:

1. Laying materials, including without limitation, brick, structural tile and blocks of concrete, cinder, glass, gypsum and terra cotta, but not including stone, to construct or repair walls, partitions, arches, sewers, and other structures;
2. Laying and aligning bricks, blocks or tiles to build or repair structures for high temperature equipment, including, without limitation, cupola, kilns, ovens and furnaces; and
3. Fastening or fusing brick or other building materials to structures with wire clamps, anchor holes, torches or cement.
4. Pointing-cleaning-caulking of all types of masonry; caulking of window frames encased in masonry on brick, stone or cement structures, including grinding and cutting out on such work and sand blasting, steam cleaning and gunite work.
5. Pointing, cleaning and weatherproofing of buildings, grain elevators and chimneys built of stone, brick or concrete, including grinding and cutting out, sand blasting and gunite work on the same.

CARPENTER, includes but is not limited to:

1. Laying out, constructing, erecting, fabricating, installing and repairing structures and fixtures of wood, plywood, or alternative materials, doors and hardware and the fastening of the same, inclusive of garage or overhead door openers, cabinets, framework, floors, and acoustical ceiling systems using carpenter's hand tools and power tools;
2. Installing or erecting metal studs, drywall, lathing, wall partitions, prefabricated EFIS panels or any other system of panels that is attached to the interior or exterior of any building or structure, insulation and all types of ceilings;
3. Pre-cast concrete and concrete form work which includes but is not limited to: setting of templates, layout, fabrication, constructing, placing, erection, rigging and hoisting, stripping and removing of all forms which are to be reused;
4. Plywood decking, including, without limitation, stacking and installation of the plywood and the plywood decking;
5. Cutting, setting, removing of beam sides and soffits, bracing, and pads;

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6. Constructing all wood panel forms and frame wall;
7. Building, erecting and disassembling self-supporting scaffolds that are more than 14 feet in height;
8. Laying out, cutting, joining, fitting of Foam Architectural Elements if same are attached mechanically; and
9. Shaping, cutting and planing by any means if done by hand or machine.

CEMENT MASON, includes but is not limited to:

1. Smoothing and finishing surfaces of poured concrete floors, walls, sidewalks and curbs to specified textures;
2. Patching holes with fresh concrete or an epoxy compound;
3. Molding expansion joints and edges through the use of edging tools, jointers and straightedges;
4. Setting of curb and gutter forms one board high;

ELECTRONIC COMMUNICATION TECHNICIAN, includes but is not limited to:

1. Pulling cable, installing and trimming devices, terminating loops, circuits, or other data gathering points;
2. Termination of main control panels, racks, or other head end equipment, as well as testing of all circuits from the field devices to the main control panels and/or equipment;
3. Utilizing test equipment for the purpose of troubleshooting and verifying the integrity of the circuits in question;
4. Using hand tools to assemble and install data communication lines and equipment computer systems, antennas and towers;
5. Disassembling equipment to adjust, repair or replace parts using hand tools;
6. Starting up, programming and documenting systems;
7. Measuring, cutting, splicing, connecting, soldering and installing wire and cable associated with communication systems

ELECTRICIAN LINEMAN, includes but is not limited to:

1. Erecting and repairing wood poles and prefabricated light duty metal towers, cable and related equipment to construct overhead transmission and distribution power lines used to conduct electrical energy between generating stations, substations and consumers;
2. Directing and assisting electrician ground men in attaching cross arms, insulators, lightning arresters, switches, wire conductors and auxiliary equipment to poles and towers in preparation of erecting the poles or towers;
3. Climbing erected poles or towers and installing equipment such as transformers

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4. Strings wire conductors between erected poles with assistance of ground helpers and adjusts slack in conductors to compensate for contraction and elongation of conductors due to temperature variations, using winch.

ELECTRICIAN GROUNDMAN, includes but is not limited to:

1. Working under the direct supervision of linemen, including the operation of jackhammers and man hauls;
2. Loading and unloading of materials and equipment used by electrician lineman.
3. Does not include climbing poles, towers or other structures or working in the proximity of energized lines or equipment;

ELECTRICIAN-NEON SIGN, includes but is not limited to:

1. Installing, servicing and repairing plastic, neon and illuminated signs;
2. Ascending ladders or operating hydraulic or electric hoist to install, service, or examine sign to determine cause of malfunction;
3. Wiring, rewiring or removing defective parts and installing new parts using electrician's tools;
4. Removing sign or part of sign for repairs, such as structural fabrication, scroll repair, or transformer repair;

ELECTRICIAN WIREMAN, includes but is not limited to:

1. Laying out plans, installing, testing and repairing wiring, electrical fixtures, apparatus and control equipment;
2. Measuring, cutting, bending, threading, assembling and installing electrical conduit by using tools including, without limitation, a hacksaw, pipe threader, or conduit bender;
3. Pulling wiring through conduit;
4. Splicing wires;
5. Connecting wiring to lighting fixtures and power equipment;
6. Installing control and distribution apparatus, including, without limitation, switches, relays and circuit breakers, and fastening such apparatus into place;
7. Connecting power cables to equipment, including, without limitation, electric ranges and motors, and installing grounding leads;
8. Testing the continuity of a circuit to ensure electrical compatibility and safety of components using testing instruments, including, without limitation, an ohmmeter, a battery and buzzer, and an oscilloscope;
9. As necessary, cutting and welding steel structural members;

ELEVATOR CONSTRUCTOR, includes but is not limited to:

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1. Assembling, installing, repairing and maintaining electric and hydraulic freight and passenger elevators, escalators and dumbwaiters;
2. Cutting pre-fabricated sections of framework, rails and other elevator components to specified dimensions, using acetylene torch, power saw, and disc grinder;
3. Installing cables, counterweights, pumps, motor foundations, escalator drives, guide rails, elevator cars, and control panels, using hand tools;

FENCE ERECTOR, includes but is not limited to:

1. Erecting or repairing chain link, wooden, tortoise, wire/wire mesh, or temporary fencing;
2. Mixing and pouring concrete around bases of posts and tamping soil into post hole to embed post;
3. Digging post holes with a spade, post hole digger or power driven auger;
4. Aligning posts through the use of lines or by sighting;
5. Verifying vertical alignment of posts with a plumb bob or spirit level;

FLAG PERSON, includes but is not limited to:

1. Directing movement of vehicular traffic through construction projects;
2. Distributing traffic control signs and markers along site in designated pattern;
3. Informing drivers of detour routes through construction sites;

FLOOR COVERER, includes but is not limited to:

1. Applying blocks, strips or sheets of shock-absorbing, sound-deadening or decorative covering to floors and walls, including carpets or rugs;
2. Measuring and cutting covering materials, such as rubber, linoleum, astro-turf, or cork tile and foundation material such as felt, using rule, straightedge, linoleum knife and snips;
3. Spreading adhesive cement over floor to cement foundation material to floor for sound-deadening, and to prevent covering from wearing at the board joints;
4. Rolling finished floors to smooth the floor and press cement into base and covering;
5. Fitting of devices for the attachment of carpet, linoleum, rubber and all resilient floor coverings and the fitting of metal edges, corners and caps used in the installation of the foregoing materials and all other preparatory work;

GLAZIER, includes but is not limited to:

1. Installing, setting, cutting, preparing, or removal of glass, or materials used in lieu thereof, including, without limitation, in windows, doorways, showers, bathtubs, skylights and display cases;

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2. Installing glass on surfaces, including, without limitation, fronts of buildings, interior walls and ceilings;
3. Installing pre-assembled framework for windows and doors designed to be fitted with glass panels, including stained glass windows by using hand tools;
4. Loading and arranging of glass on trucks at the site of the public work;

HIGHWAY STRIPER, includes but is not limited to:

1. Painting highways, streets and parking surfaces by using manually propelled or mechanically propelled machines, brushes, rollers or spray guns;
2. Installing any device or application of any material used in lieu of paint for traffic direction, including, without limitation, buttons, tapes, plastics, rumble bars and other similar materials;

HOD CARRIER-BRICK MASON TENDER, includes but is not limited to:

1. Tending to or assisting brick masons, bricklayers and stonemasons;
2. Mixing, packing, wheeling and tempering mortar and fire clay;
3. Mixing, supplying and holding materials or tools;
4. Mixing, handling and conveying all other materials used by brick masons, bricklayers and stone masons;
5. Building scaffolds, trestles, boxes and swinging staging used exclusively by bricklayers and stone masons;
6. Hanging cables and placing putlogs;
7. Carrying bricks and mortar in a hod;
8. Cleaning work area and equipment of bricklayers and stone masons

HOD CARRIER-PLASTERER TENDER, includes but is not limited to:

1. Serving Plasterers in any capacity;
2. Handling materials after the materials are delivered as used by a Plasterer;
3. Building and handling all necessary trestle, scaffolding and planking of scaffolding for the exclusive use of Plasterers;
4. Building mortar boxes, mortar boards and stands.

IRONWORKER, includes but is not limited to:

1. Performing duties, as part of a crew, to raise, place and unite girders, columns and other structural steel members to form completed structures or structure frameworks;
2. Setting up hoisting equipment for raising and placing structural steel members;
3. Fastening steel members to cable of hoist, using chains, cable or rope;
4. Forcing steel members into final position using turnbuckles, crowbars, jacks, hand tools;

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5. Aligning rivet holes in steel members with corresponding holes in previously placed steel members by driving drift pins to handle of wrench through holes;
6. Bolting aligned steel members to keep them in position until the steel members can be permanently riveted, bolted or welded into place;
7. Cutting and welding steel members;
8. Installing and repairing gates, iron doors, flagpoles, iron fences and roof decking;
9. Installing corrugated sheets when attached to steel frames;
10. Stud welding of all iron, steel and metal to structural steel;
11. Handling and setting of steel and metal joists;
12. Loading, unloading, hoisting, handling, signaling, placing and erecting of pre-stressed and pre-cast materials;
13. Handling, racking, sorting, cutting, bending, hoisting, placing, burning, welding and tying all material used to reinforce concrete construction;

LABORER, includes but is not limited to:

Perform tasks involving physical labor at building, highway, and heavy construction projects, tunnel and shaft excavations, and demolition sites. May operate hand and power tools of all types: air hammers, earth tampers, cement mixers, small mechanical hoists, and a variety of other equipment and instruments. May clean and prepare sites, dig trenches, set braces to support the sides of excavations, erect scaffolding, clean up rubble and debris, and remove asbestos, lead, and other hazardous waste materials. May assist other craft workers.

MARBLE MASON, includes but is not limited to:

1. Cutting, tooling, and setting marble slabs in floors and walls of buildings and renovating and polishing marble slabs previously set in buildings;
2. Trimming, facing and cutting marble to a specific size using a power saw, cutting and facing equipment, and hand tools
3. Drilling holes in marble slabs and attaching brackets;
4. Spreading mortar on the bottom and sides of a marble slab and on the side of adjacent marble slabs;
5. Setting blocks in positions, tamping a marble slab into place and anchoring bracket attachments with wire;
6. Filling joints between marble slabs with grout and removing excess grout with a sponge;
7. Cleaning and beveling cracks and chips on marble slabs using hand tools and power tools;
8. Heating cracked or chipped areas of a marble slab with a blowtorch and filling the defect with a composition mastic that matches the grain of the marble slab; and
9. Polishing marble slabs and other ornamental stone to a high luster by using hand tools and power tools.

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MECHANICAL INSULATOR, includes but is not limited to:

1. Covering and lining structures with cork, canvas, tar paper, magnesia and related materials;
2. Installing blown-on insulation on pipe and machinery;
3. Lining of mechanical room surfaces and air handling shafts;
4. Filling and damming of fire stops and penetrations including, but not limited to, electrical and mechanical systems;
5. Foam applications for the purpose of thermal, acoustical, or fire protective purposes, including RTV foams or equivalents, applied to mechanical or electrical systems;
6. Duct lining and duct wrapping, direct application and installation of fire protection of grease ducts, exhaust systems, or any other ductwork for acoustical or thermal purposes;
7. Insulation of field joints on pre-insulated underground piping and the pouring of Gilsilite or its equivalent;
8. The application of material, including metal and PVC jacketing, on piping, fittings, valves, flanges, boilers, ducts, plenums, flues, tanks, vats, equipment and any other hot or cold surface for the purpose of thermal control;

MILLWRIGHT, includes but is not limited to:

1. Installing machinery and equipment according to layout plans, blueprints and other drawings in industrial establishments by using hoists, lift trucks, hand tools and power tools;
2. Dismantling machines by using hammers, wrenches, crowbars and other hand tools;
3. Assembling and installing equipment, including, without limitation, shafting, conveyors, monorails and tram rails, by using hand tools and power tools;
4. Constructing foundations for machines by using hand tools and building materials, including, without limitation, wood, cement and steel;
5. Assembling machines and bolting, welding, riveting or otherwise fastening them to a foundation or other structure by using hand tools and power tools; and
6. Repairing and lubricating machines and equipment (at the site of the public work) assembled and used by millwrights.

OPERATING ENGINEER, includes but is not limited to:

Operate one or several types of power construction equipment, such as motor graders, bulldozers, scrapers, compressors, pumps, derricks, shovels, tractors, or front-end loaders to excavate, move, and grade earth, erect structures, or pour concrete or other hard surface pavement.

PAINTER, includes but is not limited to:

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1. All painting of walls, equipment, buildings, bridges and other structural surfaces by using brushes, rollers and spray guns;
2. Application of wall coverings/wall paper;
3. Removing old paint to prepare surfaces before painting the surface;
4. Mixing colors or oils to obtain desired color or consistency;
5. Sanding surfaces between coats and polishing final coat to a specified finish;
6. Cutting stencils and brushing and spraying lettering and decorations on surfaces;
7. Washing and treating surfaces with oil, turpentine, mildew remover or other preparations;
8. Filling cracks, holes and joints with caulk, putty, plaster or other filler by using caulking gun or putty knife;

PILEDRIVER, includes but is not limited to:

1. Operating pile drivers mounted on skids, barge, crawler, treads or locomotive crane to drive piling as foundations for structures including, without limitation, buildings, bridges and piers;
2. Barking, shoeing, splicing, form building, heading, centering, placing, driving, staying, framing, fastening, automatic pile threading, pulling and/or cutting off of piling;
3. Fabricating, forming, handling and setting of all such pre-cast, pre-stressed and post-stressed shapes that are an integral part of docks, piers, wharves, bulkheads, jetties, and similar structures;

PIPEFITTER, includes but is not limited to:

Assembling, installing, modifying and maintaining pipe systems, pipe supports and pneumatic equipment and related machines and equipment components for steam, hot water, heating, cooling, lubricating, sprinkling and industrial and processing systems which may require:

- a. Cutting, threading and hammering pipe to specifications using tools, including, without limitation, saws, cutting torches and pipe threaders and benders;
- b. Attaching pipes to walls, structures and fixtures, including without limitation, radiators or tanks, using brackets, clamps, tools, or welding equipment;
- c. Coating non-ferrous piping materials by dipping in mixture of molten tin and lead to prevent erosion, or galvanic and electrolytic action;

PLASTERER, includes but is not limited to:

1. Applying coats of plaster onto interior or exterior walls, ceilings, or partitions of buildings to produce a finished surface according to blueprints, architects' drawings and oral instruction;
2. Creating decorative textures in finish coat by using sand, pebbles or stones;

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3. Installing guide wires on exterior surfaces of buildings to indicate thickness of plaster or stucco;
4. Applying weatherproof, decorative covering to exterior surfaces of a building;
5. Molding and installing ornamental plaster pieces, panels and trim;
6. Directing workers to mix plaster to a desired consistency;
7. Assembly of EFIS panels;
8. Laying out, cutting, joining, fitting and installation of Architectural Foam Elements which are trowel applied or adhesive set;
9. Applying, shaping, cutting, and planing in preparation for netting done by hand or machine;
10. All plaster or synthetic finishes applied to Foam Architectural Elements

PLUMBER, includes but is not limited to:

Assembling, installing and repairing pipes, fittings and fixtures for heating, water and drainage systems inside of buildings and to a point 5 feet outside of buildings which may therein require:

- a. Repairing and maintaining plumbing by replacing defective washers, repairing or mending broken pipes, and opening clogged drains;
- b. Assembling pipe sections, tubing and fittings by using screws, bolts, solder, plastic solvent and caulking;
- c. Installing pipe assemblies, fittings, valves and fixtures, including, without limitation, sinks, toilets and tubs, by using hand tools and power tools;
- d. Cutting openings in structures, excluding concrete, to accommodate pipe and pipe fittings by using hand tools and power tools;
- e. Filling pipes and plumbing fixtures with water or air and observing pressure gauges to detect and locate leaks.

REFRIGERATION MECHANIC, includes but is not limited to:

1. Installing and repairing industrial and commercial refrigeration systems;
2. Mounting compressors, condensers and other refrigeration components to the frame of a refrigerator by using hand tools and acetylene welding equipment;
3. Assembling structural and functional components needed for refrigeration, including, without limitation, controls, switches, gauges, wiring harnesses, valves, pumps, compressors, condensers, cores and pipes;
4. Installing expansion and control valves by using hand tools and acetylene welding equipment;
5. Cutting, bending, threading and connecting pipe from functional components to water, power or refrigeration systems;
6. Fabricating and assembling components and structural portions of a refrigeration system;

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ROOFER, includes but is not limited to:

1. Installing and covering roofs and structures with slate, asphalt, wood and other related materials, other than sheet metal, by using brushes, knives, punches, hammers and other tools;
2. Spraying roofs, sidings and walls with material to bind, seal, insulate or soundproof sections of a structure;
3. Installation of all plastic, slate, slag, gravel, asphalt and composition roofing, and rock asphalt mastic when used for damp and waterproofing;
4. Installation of all damp resisting preparations when applied on roofs with mop, three-knot brush, roller, swab or spray system;
5. All types of preformed panels used in waterproofing;
6. Handling, hoisting and storing of all roofing, damp and waterproofing materials;
7. The tear-off and/or removal of roofing and roofing materials;

SHEET METAL WORKER, includes but is not limited to:

1. Fabricating, assembling, dismantling, installing or repairing:
 - Sheet metal roofs, including #30 felt roofing paper installed to form a metal roofing system;
 - Sheet metal parts or equipment, including, without limitation, duct work, metal lockers and kitchen equipment;
 - Air-veyor and air-handling systems, regardless of materials used;
2. Setting up and operating fabrication machines to cut, bend and straighten sheet metal;
3. Shaping metal over anvils, blocks or forms using a hammer;
4. Operating soldering and welding equipment to join sheet metal parts;
5. Inspecting, assembling and smoothing seams and joints of burred surfaces;
6. Welding, soldering, bolting, riveting, screwing, clipping, caulking or bonding component parts to assemble products by using hand tools, power tools and devices for lifting and handling;

SPRINKLER FITTER, includes but is not limited to:

Installing, dismantling, maintaining, repairing, adjusting and correcting all fire protection and fire control systems, including the installation of piping or tubing, appurtenances and equipment pertaining thereto, including both overhead and underground water mains, fire hydrants, and hydrant mains, standpipes and hose connection to sprinkler systems, sprinkler tank heaters, air lines and thermal systems used in connection with sprinkler and alarm systems.

SURVEYOR, includes but is not limited to:

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1. Planning ground surveys designed to establish base lines, elevation and other geodetic measurements;
2. Compiling data relevant to the shape, contour, gravitation, location, elevation and dimension of land and land features on or near the surface of the Earth for engineering, map making, mining, land evaluation, construction and other purposes;
3. Surveying bodies of water to determine navigable channels and to secure data for construction of breakwaters, piers and other marine structures;
4. Computing data necessary for driving and connecting underground passages, underground storage and volume of underground deposits.

TAPER, includes but is not limited to:

1. Sealing joints between plasterboard or other wallboards to prepare a wall surface for painting or papering;
2. Mixing sealing compound by hand or with a portable electric mixer and spreading the compound over the joints between boards using a trowel, broad knife, or spatula;
3. Filling cracks and holes in walls and ceilings with sealing compound ;
4. Applying texturing compound and primer to walls and ceiling to prepare a surface for a final finish by using brushes, rollers and spray guns;
5. Coating of joint compound or taping mud;

TERRAZZO WORKER, includes but is not limited to:

1. Applying cement, sand, pigment and marble chips to floors and stairways to attain durable and decorative surfacing according to specifications or drawings;
2. Spreading mixtures of sand, cement and water over surface with a trowel to form terrazzo;
3. Cutting metal division strips and pressing the metal division strips into a terrazzo base so that top edges form a desired design or pattern and define level of finished floor surface;
4. Spreading mixtures of marble chips, cement, pigment and water over a terrazzo base to form a finished surface by using a float and trowel;
5. Pre-casting terrazzo blocks in wooden forms

TILE SETTER, includes but is not limited to:

1. Applying tile and materials made for tile in tile-like units to walls, floors, ceilings and promenade roof decks following design specification;
2. Applying glazed, unglazed, mosaic and other ceramic tiles, which are used as a surface on floors, walls, ceilings, and other surfaces and which must be set to specific grade;
3. Applying and floating all setting beds into which glazed, unglazed, mosaic, or other ceramic tiles are set;
4. Leveling and plumbing tiles to a specified grade

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TILE, TERRAZZO AND MARBLE FINISHER, includes but is not limited to:

1. Supplying and mixing construction materials for a tile setter, terrazzo worker or marble setter;
2. Applying grout and finishing the surface of installed tile, terrazzo and marble;
3. Cleaning installed tile, terrazzo and tile surfaces;
4. Renovation and filling chipped, cracked and broken pieces of tile, terrazzo and marble;
5. Grinding and polishing tile, terrazzo and marble;
6. Assisting a tile setter, terrazzo worker or marble setter;

TRAFFIC BARRIER ERECTOR, includes but is not limited to:

Erects or places instruments to provide directional assistance to traffic on or near the public works construction project.

TRUCK DRIVER, includes but is not limited to:

Driving a tractor trailer combination or a truck to transport goods or materials at the site of a public work or between sites of a public work. (Also, see descriptions listed with Truck Driver rates, if any.)

WELL DRILLER, includes but is not limited to:

1. Setting, operating or tending to portable drilling rig machinery and related equipment to drill wells;
 2. Extending stabilizing jackscrews to support and level a drilling rig;
 3. Installing water well pumps;
 4. Drillings wells for industrial water supplies, irrigation water supplies or water supplies for any other purpose; dewatering or other similar purposes; exploration; hole drilling for geologic and hydrologic information; and core drilling for geologic information.
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GROUP CLASSIFICATIONS

LABORER, includes but is not limited to:

Group 1

All cleanup work of debris, grounds, and building including windows and tile

Dumpmen or Spotter (other than asphalt)
Handling and Servicing of Flares, Watchmen
General Laborer
Guide Posts and Highway Signs
Guardrail Erection and Dismantling
Limber, Brushloader and Piler
Pavement Marking and Highway Striping
Traffic Control Supervisor

Group 2

Choker setter or Rigger (clearing work only) Pittsburgh
Chipper and similar type brush shredders
Concrete worker (wet or dry) all concrete work not listed in Group 3
Crusher or Grizzly Tender
Greasing Dowels
Guinea Chaser (Stakemen)
Panel Forms (wood or metal) handling, cleaning and stripping of Loading and unloading,
(Carrying and handling of all rods and material for use in reinforcing concrete
Railroad Trackmen (maintenance, repair or builders)
Sloper
Semi-Skilled Wrecker (salvaging of building materials other than those listed in Group 3)

Group 3

Asphalt Workers (Ironers, Shovelers, Cutting Machine)
Buggymobile
Chainsaw, Faller, Logloader and Bucker
Compactor (all types)
Concrete Mixer under 1/2 yard
Concrete Pan Work (Breadpan type), handling, cleaning\stripping
Concrete Saw, Chipping, Grinding, Sanding, Vibrator
Cribbing, Shoring, Lagging, Trench Jacking, Hand-Guided Lagging Hammer
Curbing or Divider machine
Curb Setter (precast or cut)

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Ditching Machine (hand-guided)
Drillers Helper, Chuck Tender
Form Raiser, Slip Forms
Grouting of Concrete Walls, Windows and Door Jams
Headerboardmen
Jackhammer, Pavement Breaker, Air Spade
Mastic Worker (wet or dry)
Pipewrapper, Kettlemen, Potmen, and men applying asphalt, creosote and similar type materials
All Power Tools (air, gas, or electric), Post Driver
Riprap-Stonepaver and RockSlinger, including placing of sack concrete wet or dry
Rototiller
Rigging and Signaling in connection with Laborers' work
Sandblaster, Potmen, Gunmen or Nozzlemen
Vibra-screed
Skilled Wrecker (removing and salvaging of sash, windows, doors, plumbing and electrical fixtures)

Group 4

Burning and Welding in connection with Laborers' work
Joy Drill Model TWM-2A, Gardner Denver Model DN143 and similar type drills (in accordance with Memorandum of Understanding between Laborers and Operating Engineers dated at Miami, Florida, Feb. 3, 1954) and Track Drillers, Diamond Core Drillers, Wagon Drillers, Mechanical Drillers on Multiple Units
High scalers
Concrete pump operator
Heavy Duty Vibrator with Stinger 5" diameter or over
Pipelayer, Caulker and Bander
Pipelayer-waterline, Sewerline, Gasoline, Conduit
Cleaning of Utility Lines
Slip Lining of Utility Lines (including operation of Equipment)
TV Monitoring and Grouting of Utility Lines
Asphalt Rakers

Group 4A

Foreman

Group 5

Construction Specialists
Blasters and Powdermen, all work of loading, placing, and blasting of all powder and explosives of any type, regardless of method used for such loading and placing
Asbestos removal

2013-2014 Prevailing Wage Rates – Carson City County

ATTACHMENT A

Lead abatement
Hazardous waste
Material removal

Group 6

Gunite Foremen, Nozzlemen, Rodmen, Gunmen, Materialmen, Reboundmen

OPERATING ENGINEER, includes but is not limited to:

Group 1

Engineer Assistant

Group 1A

Heavy Duty Repairman Helper
Oiler
Parts man

Group 2

Compressor Operator
Material Loader and/or Conveyor Operator (handling building materials)
Pump Operator

Group 3

Bobcat or similar loader, 1/4 cu. yd. or less
Concrete Curing Machines (streets, highways, airports, canals)
Conveyor Belt Operator (tunnel)
Forklift (under 20)
Engineer Generating Plant (500 K.W.)
Mixer Box Operator (concrete plant)
Motorman
Rotomist Operator
Oiler (truck crane)

Group 4

Concrete Mixer Operator, Skip type
Dinky Operator
Forklift (20' or over) or Lumber Stacker
Ross Carrier
Skip Loader Operator (under one (1) cu. yd.)
Tie Spacer

2013-2014 Prevailing Wage Rates – Carson City County

ATTACHMENT A

Group 5

Concrete Mixers (over one (1) cu. yd.)
Concrete Pumps or Pumpcrete Guns
Elevator and Material Hoist (one (1) drum)
Groundman for Asphalt Milling and similar

Group 6

Auger type drilling equipment up to and including 30 ft. depth digging capacity m.r.c.
Boom Truck or Dual Purpose a-Frame Truck
B.L.H. Lima Road Pactor or similar
Chip Box Spreader (Flaherty type or similar)
Concrete Batch Plant (wet or dry)
Concrete Saws (highways, streets, airports, canals)
Locomotives (over thirty (30) tons)
Maginnis International Full Slab Vibrator (airports, highways, canals and warehouses)
Mechanical Finishers (concrete) (Clary, Johnson, Bidwell Bridge Deck or similar types)
Mechanical Burn, Curb and/or Curb and Gutter Machine (concrete or asphalt)
Pavement Breaker, Truck Mounted, with compressor combination
Pavement Breaker or Tamper (with or without compressor combination)
Power Jumbo Operator (setting slip-forms, etc., in tunnels)
Roller Operator (except asphalt)
Self-Propelled Tape Machine
Self-Propelled Compactor (single engine)
Self-Propelled Power Sweeper Operator
Slip-Form Pump (power-driven by hydraulic, electric, air, gas, etc. lifting device for concrete forms)
Small Rubber-Tired Tractors
Snooper Crane, Paxton-Mitchell or similar
Stationary Pipe Wrapping, Cleaning and Bending Machine Operator

Group 7

Auger type drilling equipment over 30 ft. depth digging capacity m.r.c.
Compressor (over 2)
Concrete Conveyor or Concrete Pump, truck or equipment mounted (any assistance required shall be performed by an Assistant to Engineer) Boom length to apply
Concrete Conveyor, Building Site
Drilling and Boring Machine, vertical and horizontal (not to apply to waterliners, wagon drills or jack hammers)
Crusher Plant Engineer
Generators
Kolman Loader
Material Hoist (two (2) or more drums)

2013-2014 Prevailing Wage Rates – Carson City County

ATTACHMENT A

Mechanical Finishers or Spreader Machine (asphalt, Barber-Greene or similar)
Mine or Shaft Hoist
Pipe Bending Machines (pipeline only)
Pipe Cleaning Machines (tractor-propelled and supported)
Pipe Wrapping Machines (tractor-propelled and supported)
Portable Crushing and Screening Plants
Post Driller And/Or Driver
Pumps (over 2)
Roller Operator (asphalt)
Screedman (except asphaltic or concrete paving)
Screedman (Barber-Greene and similar) (asphaltic or concrete paving)
Self-Propelled Boom-Type Lifting Device (center mount) (on ten (10) ton capacity or less)
Slusher Operator
Surface Heater and Planer Operator
Trenching Machine (maximum digging capacity three (3) ft. depth) (Any assistance in the operation, if needed, shall be performed by an Assistant to Engineer)
Truck-Type Loader
Welding Machines (gasoline or diesel)

Group 8

Asphalt Plant Engineer
Asphalt Milling Machine
Cast-In-Place Pipe-Laying Machine
Combination Slusher and Motor Operator
Concrete Batch Plant (multiple units)
Dozer Operator
Drill Doctor
Elevating Grader Operator
Grooving and Grinding Machine (highways)
Ken Seal Operator
Loader (up to and including two and one-half (2 1/2) cu. yds)
Mechanical Trench Shield
Mixermobile
Push Cats
Road Oil Mixing Machine Operator Wood-Mixer (and other similar Pugmill equipment)
Rubber-Tired Earthmoving Equipment (up to and including thirty-five (35) cu. yds. "struck " m.r.c., Euclids, T-Pulls, DW10, 20, 21 and similar)
Self-Propelled Compactors with Dozer; Hyster 450, Cat 825 or similar
Sheepfoot
Small Tractor (with boom)
Soil Stabilizer (P & H or equal)
Timber Skidder (rubber-tired) or similar equipment

2013-2014 Prevailing Wage Rates – Carson City County

ATTACHMENT A

Tractor-Drawn Scraper
Tractor Operator
Tractor-Mounted Compressor Drill Combination
Trenching Machine Operator (over three (3) feet depth)
Tri-Batch Paver
Tunnel Badger or Tunnel Boring Machine Operator
Tunnel Mole Boring Machine
Vermeer T-600b Rock Cutter

Group 9

Chicago Boom
Combination Backhoe and Loader (up to and including 3/8 cu. yd.)
Combination Mixer and Compressor (gunite)
Heavy Duty Repairman and/or Welder
Lull Hi-Lift (twenty (20) feet or over)
Mucking Machine
Sub-Grader (Gurries or other types)
Tractor (with Boom) (D6 or larger)
Track-Laying-Type Earthmoving Machine (single engine with tandem scrapers)

Group 10

Boom-Type Backfilling Machine
Bridge Crane
Cary-Lift or similar
Chemical Grouting Machine
Derricks (two (2) Group 10 Operators required when swing engine remote from hoist)
Derrick Barges (except excavation work)
Euclid Loader and similar types
Gradesetter, Grade Checker
Heavy Duty Rotary Drill Rigs
Lift-Slab (Vagtborg and similar types)
Loader (over two and one-half (2 1/2 cu. yds. up to and including four (4) cu. yds.)
Locomotive (over one hundred (100) tons, single or multiple units)
Multiple-Engine Earthmoving Machines (Euclid Dozers, etc.)
Pre-Stress Wire Wrapping Machine
Rubber-Tired Scraper, Self-Loading
Single-Engine Scraper (over thirty-five (35) cu. yds.)
Shuttle Car (Reclaim Station)
Train Loading Station
Trenching Machine multi-engine with sloping attachments (Jefco or similar)

2013-2014 Prevailing Wage Rates – Carson City County

ATTACHMENT A

Vacuum Cooling Plant
Whirley Crane (up to and including twenty-five (25) tons)

Group 10A

Backhoe-Hydraulic (up to and including one (1) cu. yd.)
Backhoe (up to and including one (1) cu. yd.) (Cable)
CMI Dual Lane Auto-Grader SP30 or similar type
Cranes (not over twenty-five (25) tons) (hammerhead and gantry)
Finish Blade
Gradalls (up to and including one (1) cu. yd.)
Motor Patrol Operator
Power Shovels, Clamshells, Draglines, Cranes (up to and including one (1) cu. yd.)
Rubber-Tired Scraper, Self-Loading (twin engine)
Self-Propelled Boom-Type Lifting Device, center mount (over 10 tons up to and including 25 tons)

Group 11

Automatic Asphalt or Concrete Slip-Form Paver
Automatic Railroad Car Dumper
Canal Trimmer
Cary Lift, Campbell or similar type
Cranes (over twenty-five (25) tons)
Euclid Loader when controlled from the Pullcat
Highline Cableway Operator
Loader (over four (4) cu. yds. up to and including twelve (12) cu. yds.)
Multi-Engine Earthmoving Equipment (up to and including seventy-five (75) cu. yds. struck m.r.c.)
Multi-Engine Scrapers (when used to Push Pull)
Power Shovels, Clamshells, Draglines, Backhoes Gradalls (over one (1) cu. yd. and up to and including seven (7) cu. yds. m.r.c.)
Self-Propelled Boom-Type Lifting Device (center mount) (over 25 tons m.r.c.)
Self-Propelled Compactor (with multiple-propulsion power units)
Single-Engine Rubber-Tired Earthmoving Machine, with Tandem Scraper
Slip-Form Paver (concrete or asphalt)
Tandem Cats and Scraper
Tower Crane Mobile (including Rail Mount)
Truck Mounted Hydraulic Crane when remote control equipped (over 10 tons up to and including 25 tons)
Universal Liebherr and Tower Cranes (and similar types)
Wheel Excavator (up to and including seven hundred fifty (750) cu. yds. per hour)
Whirley Cranes (over twenty-five (25) tons)

2013-2014 Prevailing Wage Rates – Carson City County

ATTACHMENT A

Group 11A

Band Wagons (in conjunction with Wheel Excavators)
Operator of Helicopter (when used in construction work)
Loader (over twelve (12) cu. yds.)
Multi-Engine Earthmoving Equipment (over seventy-five (75) cu. yds. "struck" m.r.c.)
Power Shovels, Clamshells, Draglines, Backhoes, and Gradalls (over seven (7) cu. yds. m.r.c.)
Remote-Controlled Earth Moving Equipment
Wheel Excavator (over seven hundred fifty (750) cu. yds. per hour)

Group 11B

Holland Loader or similar or Loader (over 18 cu. yds.)

OPERATING ENGINEERS - Steel Fabricator & Erector

Group 1

Cranes over 100 tons
Derrick over 100 tons
Self-Propelled Boom Type Lifting Devices over 100 tons

Group 2

Cranes over 45 tons up to and including 100 tons
Derrick, 100 tons and under
Self Propelled Boom Type Lifting Device, over 45 tons
Tower Crane

Group 3

Cranes, 45 tons and under
Self Propelled Boom Type Lifting Device, 45 tons and under

Group 4

Chicago Boom
Forklift, 10 tons and over
Heavy Duty Repairman/Welder

Group 5

Boom Cat

2013-2014 Prevailing Wage Rates – Carson City County

ATTACHMENT A

OPERATING ENGINEER -Piledriver

Group 1

Derrick Barge Pedestal mounted over 100 tons
Clamshells over 7 cu. yds.
Self Propelled Boom Type Lifting Device, over 100 tons
Truck Crane or Crawler, land or barge mounted over 100 tons

Group 2

Derrick Barge Pedestal mounted 45 tons up to and including 100 tons
Clamshells up to and including 7 cu. yds.
Self Propelled Boom Type Lifting Device over 45 tons
Truck Crane or Crawler, land or barge mounted, over 45 tons up to and including 100 tons

Group 3

Derrick Barge Pedestal mounted under 45 tons
Self Propelled Boom Type Lifting Device 45 tons and under
Skid/Scow Piledriver, any tonnage
Truck Crane or Crawler, land or barge mounted 45 tons and under

Group 4

Assistant Operator in lieu of Assistant to Engineer
Forklift, 10 tons and over
Heavy Duty Repairman/Welder

Group 5

No current classification

Group 6

Deck Engineer

Group 7

No current classification

Group 8

Deckhand
Fireman

ATTACHMENT A

ZONE RATES

BRICKLAYER

In addition to BRICKLAYER rates add the applicable amounts per hour, calculated based on a radius of over fifty (50) miles from the Washoe County Courthouse in Reno, Nevada:

Zone 1-0-35 Miles	\$0.00
Zone 2-36-75 Miles	\$1.25
Zone 3-Over 75 Miles	\$5.37

CARPENTER (Building and Heavy Highway and Dam Construction)

In addition to CARPENTER rates add the applicable amounts per hour, calculated from the Washoe County Courthouse:

Zone 1-0 to 50 miles	\$0.00 (road miles of either the Carson City Courthouse or the Washoe County Courthouse)
Zone 2-51-150 miles	\$3.00
Zone 3-151-300 miles	\$4.00
Zone 4-301 miles and over	\$5.00

CEMENT MASON

In addition to CEMENT MASON rates add the applicable amounts per hour, calculated from the Reno Post Office, 50 So. Virginia St., Reno, Nevada:

Zone 1-0-90 miles	\$0.00
Zone 2-91 miles and over	\$6.00

ELECTRICIAN

In addition to Electrician rates add the applicable amounts per hour, calculated from the Washoe County Courthouse:

Zone 1-0-70 miles	\$0.00
Zone 2-71-90 miles	\$8.00
Zone 3 -91 miles and over	\$10.00

ELECTRICIAN-COMMUNICATION TECH

In addition to Electrician Communication Tech rates add the applicable amounts per hour, calculated from the Washoe County Courthouse:

Zone 1-0-70 miles	\$0.00
Zone 2-71-90 miles	\$5.00
Zone 3 -91 miles and over	\$7.00

ATTACHMENT A

HOD CARRIER-BRICK MASON TENDER

In addition to Hod Carrier Brick Mason Tender rates, add the applicable amounts per hour, calculated based on a radius from the Washoe County Courthouse:

Zone 1-35 to 75 miles	\$1.25
Zone 2-76 miles and over	\$7.50

HOD CARRIER-PLASTERER

In addition to Hod Carrier Plasterer rates add the applicable amounts per hour, calculated based on a radius from So. Virginia St., Reno, Nevada:

Zone 1-70 miles	\$0.00
Zone 70 miles and over	\$8.00

LABORER (Highway and Dam Construction only)

In addition to LABORER rates add the applicable amounts per hour, calculated based on a radius from either the Carson City Courthouse or the Washoe County Courthouse:

Zone 1-0 to 50 miles	\$0.00
Zone 2-51 to 150 miles	\$3.00
Zone 3-151 to 300 miles	\$4.00
Zone 4-301 miles and over	\$5.00

LABORER (Building Construction)

In addition to LABORER rates add the applicable amounts per hour, calculated based on road miles from either the Carson City Courthouse or the Washoe County Courthouse:

Zone 1-0 to 50 miles	\$0.00
Zone 2-51 to 150 miles	\$3.00
Zone 3-151 to 300 miles	\$4.00
Zone 4-301 miles and over	\$5.00

MECHANICAL INSULATOR

In addition to MECHANICAL INSULATOR rates add the applicable amounts per hour, calculated based on a radius figured from Clark County Courthouse:

Zone 1-20-45 miles-	\$3.75
Zone 2-45-75 miles-	\$5.00
Zone 3-75-150 miles-	\$7.50
Zone 4-150 miles and over-	\$8.75

2013-2014 Prevailing Wage Rates – Carson City County

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MILLWRIGHT

In addition to MILLWRIGHT rates, add the applicable amounts per hour, calculated on road miles from either the Carson City Courthouse or the Washoe County Courthouse:

Zone 1-1 to 15 miles	\$0.00
Zone 2-15 to 35 miles	\$1.50
Zone 3-35 miles and over	\$3.25

OPERATING ENGINEER

In addition to: OPERATING ENGINEER; STEEL FABRICATOR and ERECTOR, PILEDRIVER, SURVEYOR, and LUBRICATION AND SERVICE ENGINEER rates add the applicable amounts per hour calculated based on a radius from the Washoe County Courthouse:

Zone 1-0 to 75 miles	\$0.00
Zone 2-75 to 150 miles	\$3.00
Zone 3-151 to 300 miles	\$4.00
Zone 4-301 miles and over	\$5.00

PLASTERER

In addition to PLASTERER rates add the applicable amounts per hour, calculated from the South Virginia and Mill Street, Reno, Nevada:

Zone 1-0-70 miles	\$0.00
Zone 2-70 miles and over	\$8.00

SHEET METAL WORKER

In addition to AIR BALANCE AND SHEET METAL WORKER rates, add the applicable amounts per hour, calculated based on a radius from the courthouse in Reno, Nevada:

Zone 1-0 to 75 miles	\$0.00
(including the City of Fallon and the Fallon Naval Air Base)	
Zone 2-over 75 miles	\$8.12

TILE SETTER/TERRAZZO WORKER/MARBLE MASON

In addition to TILE SETTER/TERRAZZO WORKER/MARBLE MASON rates add the applicable amounts per hour, calculated based on a radius of over thirty-five (35) miles from the Washoe County Courthouse in Reno, Nevada:

Zone 1-0-35 Miles	\$0.00
Zone 2-35-75 Miles	\$1.25
Zone 3-Over 75 Miles	\$5.00

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2013-2014 Prevailing Wage Rates

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- [Forms & Publications](#)

- [Frequently Asked Questions](#)

- [Public Works/Prevailing Wages](#)

- [Statutes & Regulations](#)

Amendment 5 (Clerical)

- ClassClassification – *Operating Engineer*
- County – *Carson City, Churchill, Douglas, Elko, Eureka, Humboldt, Lander, Lyon, Mineral, Pershing, Washoe*
- Effective Date – November 13, 2013

<i>Operating Engineer Foreman</i>	53.09	ADD ZONE RATE
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ATTACHMENT B

General Decision Number: NV140003 08/08/2014 NV3

Superseded General Decision Number: NV20130003

State: Nevada

Construction Type: Building

County: Carson City County in Nevada.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Modification Number	Publication Date
0	01/03/2014
1	02/07/2014
2	05/09/2014
3	07/11/2014
4	08/08/2014

* BRNV0013-001 08/01/2014

	Rates	Fringes
BRICKLAYER.....	\$ 26.15	6.98

* BRNV0013-003 07/01/2014

	Rates	Fringes
MARBLE MASON.....	\$ 28.08	6.84
TILE FINISHER.....	\$ 19.78	5.94
TILE SETTER.....	\$ 26.58	6.84

CARP0971-001 07/01/2014

	Rates	Fringes
CARPENTER (Including Drywall Hanging, Form Worker, and Metal Stud Installation).....	\$ 27.54	12.73

ZONE PAY:

ZONE 1: All work within 50 road miles of either Carson City Courthouse or Washoe County Courthouse shall be considered a Free Zone.

ZONE 2: All work within 50 to 150 road miles of the Washoe County Courthouse shall receive \$3.00 additional per hour.

ZONE 3: All work within 150 to 300 road miles of the Washoe County Courthouse shall receive \$4.00 additional per hour.

ZONE 4: Any work performed in excess of 300 road miles of the Washoe County Courthouse shall receive \$5.00 additional per hour.

ATTACHMENT B

ELEC0401-001 07/01/2013

	Rates	Fringes
ELECTRICIAN.....	\$ 37.00	14.62

ZONE PAY: Shall be measured in air miles from the Washoe County Courthouse

Zone 1 - 0 to 70 miles \$0.00 Per Hour
 Zone 2 - 72 to 90 miles \$6.00 Per Hour
 Zone 3 - 91 miles and over \$8.00 Per Hour

ENGI0003-006 07/01/2013

	Rates	Fringes
OPERATOR: Power Equipment		
(03)Excavator and Grader (Finishing and Non-Finishing).....	\$ 29.82	17.72
(03)Forklift (under 20 ft) and Skid Loader/Bobcat.....	\$ 29.82	17.72
(04)Forklift (20 ft and over).....	\$ 30.56	17.72
(06)Base Roller (Ride Along) and Paver (Incl. Asphalt).....	\$ 31.03	17.72
(08)Bulldozer, Loader (up to and including two and one-half [2-1/2] cu. yds.) and Scraper.....	\$ 31.87	17.72
(09)Mechanic.....	\$ 32.19	17.72
(10)Loader (over two and one-half [2-/12] cu. yds. up to and including four [4] cu. yds).....	\$ 32.54	17.72
(11)Loader (over four [4] cu. yds. up to and including twelve [12] cu. yds.).....	\$ 32.97	17.72
(11a)Loader (over twelve [12] cu.yds.).....	\$ 34.61	17.72

AREA PAY (Free Area and Remote Area Rates)

AREA 1 PAY SCALE: All that area falling within fifty (50) road miles of either the Carson City Courthouse or the Washoe County Courthouse shall be considered a free area for the purpose of this agreement.

AREA 2 PAY SCALE: All work falling between fifty (50) and one hundred and fifty (150) road miles of the Washoe County Courthouse shall be computed at an additional \$2.00 per hour.

AREA 3 PAY SCALE: All work falling between one hundred and fifty (150) and three hundred (300) miles of the Washoe County Courthouse shall be computed at an additional \$4.00

ATTACHMENT B

per hour.

AREA 4 PAY SCALE: Any work performed in excess of three hundred (300) road miles of the Washoe County Courthouse shall be computed at an additional \$4.00 per hour.

IRON0118-002 01/01/2014

	Rates	Fringes
IRONWORKER (Ornamental, Reinforcing, and Structural).....	\$ 33.50	26.80

LABO0169-005 10/01/2013

	Rates	Fringes
LABORER		
(1) Common or General, Cone Setter.....	\$ 22.90	8.67
(1A) Flagger.....	\$ 20.03	8.67
(3) Asphalt Shoveler, Concrete Saw, Concrete Vibrator, Form Stripping, Jackhammer, Mason Tender - Cement/Concrete, Plaster Tender, Trencher-hand guided.....	\$ 23.15	8.67
(4) Asphalt Dumpman, Pipelayer.....	\$ 23.40	8.67
(5) Asbestos Removal (Floor, Wall, & Ceiling)....	\$ 23.70	8.67

* PAIN0567-013 07/01/2014

	Rates	Fringes
PAINTER		
Drywall Finishing.....	\$ 27.75	11.23
Paperhanger, Spray.....	\$ 24.01	10.33
Prep, Brush, Roller.....	\$ 23.16	10.33

PLAS0797-003 10/01/2010

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER....	\$ 25.98	9.27

PLAS0797-006 07/01/2010

	Rates	Fringes
PLASTERER.....	\$ 22.00	8.63

PLUM0350-004 08/01/2012

	Rates	Fringes
PLUMBER/PIPEFITTER.....	\$ 34.34	10.91

ATTACHMENT B

SHEE0026-001 08/01/2013

	Rates	Fringes
SHEET METAL WORKER (Including HVAC Duct Installation and Metal Roof).....	\$ 28.63	19.14

TEAM0533-003 12/01/2010

	Rates	Fringes
TRUCK DRIVER Flatbed.....	\$ 28.61	13.64

SUNV2007-001 08/01/2007

	Rates	Fringes
LABORER: Landscape.....	\$ 9.85	0.00
LABORER: Mason Tender - Brick...	\$ 15.96	0.00
OPERATOR: Backhoe.....	\$ 16.67	0.00
OPERATOR: Trencher, Excluding Hand Guided Trencher...	\$ 27.96	0.00
PLUMBER, Excludes HVAC Pipe Installation.....	\$ 23.31	6.20
ROOFER, Excludes Installation of Metal Roofs.....	\$ 14.23	3.03
TRUCK DRIVER, Includes Dump Truck.....	\$ 16.90	0.00
TRUCK DRIVER: Water Truck.....	\$ 17.22	2.45

WELDERS - Receive rate prescribed for craft performing
operation to which welding is incidental.
=====

Unlisted classifications needed for work not included within
the scope of the classifications listed may be added after
award only as provided in the labor standards contract clauses
(29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification
and wage rates that have been found to be prevailing for the
cited type(s) of construction in the area covered by the wage
determination. The classifications are listed in alphabetical

ATTACHMENT B

order of "identifiers" that indicate whether the particular rate is union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters, PLUM, indicate the international union and the four-digit number, 0198, that follows indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rates.

0000/9999: weighted union wage rates will be published annually each January.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union majority rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests

ATTACHMENT B

for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

ATTACHMENT C

REQUIRED FEDERAL CLAUSES (Construction Contracts Exceeding \$100,000)

By submitting a proposal, the Proposer agrees to comply with the following Federal certifications and clauses for third-party contracts.

NOTE: The Buy America and Lobbying certifications must be signed by an Authorized Official of the Proposer and returned with the proposal.

NO FEDERAL GOVERNMENT OBLIGATIONS TO THIRD PARTIES

(1) The Purchaser and Contractor acknowledge and agree that, notwithstanding any concurrence by the Federal Government in or approval of the solicitation or award of the underlying contract, absent the express written consent by the Federal Government, the Federal Government is not a party to this contract and shall not be subject to any obligations or liabilities to the Purchaser, Contractor, or any other party (whether or not a party to that contract) pertaining to any matter resulting from the underlying contract.

(2) The Contractor agrees to include the above clause in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clause shall not be modified, except to identify the subcontractor who will be subject to its provisions.

PROGRAM FRAUD AND FALSE OR FRAUDULENT STATEMENTS AND RELATED ACTS

(1) The Contractor acknowledges that the provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 U.S.C. § 3801 *et seq.* and U.S. DOT regulations, "Program Fraud Civil Remedies," 49 C.F.R. Part 31, apply to its actions pertaining to this Project. Upon execution of the underlying contract, the Contractor certifies or affirms the truthfulness and accuracy of any statement it has made, it makes, it may make, or causes to be made, pertaining to the underlying contract or the FTA assisted project for which this contract work is being performed. In addition to other penalties that may be applicable, the Contractor further acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification, the Federal Government reserves the right to impose the penalties of the Program Fraud Civil Remedies Act of 1986 on the Contractor to the extent the Federal Government deems appropriate.

(2) The Contractor also acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification to the Federal Government under a contract connected with a project that is financed in whole or in part with Federal assistance originally awarded by FTA under the authority of 49 U.S.C. § 5307, the Government reserves the right to impose the penalties of 18 U.S.C. § 1001 and 49 U.S.C. § 5307(n)(1) on the Contractor, to the extent the Federal Government deems appropriate.

(3) The Contractor agrees to include the above two clauses in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clauses shall not be modified, except to identify the subcontractor who will be subject to the provisions.

ACCESS TO RECORDS

The following access to records requirements apply to this Contract:

1. Where the Purchaser is not a State but a local government and is the FTA City or a subgrantee of the FTA City in accordance with 49 C. F. R. 18.36(i), the Contractor agrees to provide the Purchaser, the FTA Administrator, the Comptroller General of the United States or any of their authorized representatives access to any books, documents, papers and records of the Contractor which are directly pertinent to this

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contract for the purposes of making audits, examinations, excerpts and transcriptions. Contractor also agrees, pursuant to 49 C. F. R. 633.17 to provide the FTA Administrator or his authorized representatives including any PMO Contractor access to Contractor's records and construction sites pertaining to a major capital project, defined at 49 U.S.C. 5302(a)1, which is receiving federal financial assistance through the programs described at 49 U.S.C. 5307, 5309 or 5311.

2. Where the Purchaser is a State and is the FTA City or a subgrantee of the FTA City in accordance with 49 C.F.R. 633.17, Contractor agrees to provide the Purchaser, the FTA Administrator or his authorized representatives, including any PMO Contractor, access to the Contractor's records and construction sites pertaining to a major capital project, defined at 49 U.S.C. 5302(a)1, which is receiving federal financial assistance through the programs described at 49 U.S.C. 5307, 5309 or 5311. By definition, a major capital project excludes contracts of less than the simplified acquisition threshold currently set at \$100,000.

3. Where the Purchaser enters into a negotiated contract for other than a small purchase or under the simplified acquisition threshold and is an institution of higher education, a hospital or other non-profit organization and is the FTA City or a subgrantee of the FTA City in accordance with 49 C.F.R. 19.48, Contractor agrees to provide the Purchaser, FTA Administrator, the Comptroller General of the United States or any of their duly authorized representatives with access to any books, documents, papers and record of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts and transcriptions.

4. Where any Purchaser which is the FTA City or a subgrantee of the FTA City in accordance with 49 U.S.C. 5325(a) enters into a contract for a capital project or improvement (defined at 49 U.S.C. 5302(a)1) through other than competitive bidding, the Contractor shall make available records related to the contract to the Purchaser, the Secretary of Transportation and the Comptroller General or any authorized officer or employee of any of them for the purposes of conducting an audit and inspection.

5. The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.

6. The Contractor agrees to maintain all books, records, accounts and reports required under this contract for a period of not less than three years after the date of termination or expiration of this contract, except in the event of litigation or settlement of claims arising from the performance of this contract, in which case Contractor agrees to maintain same until the Purchaser, the FTA Administrator, the Comptroller General, or any of their duly authorized representatives, have disposed of all such litigation, appeals, claims or exceptions related thereto. Reference 49 CFR 18.39(i)(11).

7. FTA does not require the inclusion of these requirements in subcontracts.

FEDERAL CHANGES

Contractor shall at all times comply with all applicable FTA regulations, policies, procedures and directives, including without limitation those listed directly or by referenced in the Master Agreement between Purchaser and FTA, as they may be amended or promulgated from time to time during the term of this contract. Contractor's failure to so comply shall constitute a material breach of this contract.

CIVIL RIGHTS (EEO, TITLE VI & ADA)

The following requirements apply to the underlying contract:

(1) Nondiscrimination - In accordance with Title VI of the Civil Rights Act, as amended, 42 U.S.C. § 2000d, section 303 of the Age Discrimination Act of 1975, as amended, 42 U.S.C. § 6102, section 202 of

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the Americans with Disabilities Act of 1990, 42 U.S.C. § 12132, and Federal transit law at 49 U.S.C. § 5332, the Contractor agrees that it will not discriminate against any employee or applicant for employment because of race, color, creed, national origin, sex, age, or disability. In addition, the Contractor agrees to comply with applicable Federal implementing regulations and other implementing requirements FTA may issue.

(2) Equal Employment Opportunity - The following equal employment opportunity requirements apply to the underlying contract:

(a) Race, Color, Creed, National Origin, Sex - In accordance with Title VII of the Civil Rights Act, as amended, 42 U.S.C. § 2000e, and Federal transit laws at 49 U.S.C. § 5332, the Contractor agrees to comply with all applicable equal employment opportunity requirements of U.S. Department of Labor (U.S. DOL) regulations, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor," 41 C.F.R. Parts 60 et seq., (which implement Executive Order No. 11246, "Equal Employment Opportunity," as amended by Executive Order No. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," 42 U.S.C. § 2000e note), and with any applicable Federal statutes, executive orders, regulations, and Federal policies that may in the future affect construction activities undertaken in the course of the Project. The Contractor agrees to take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, creed, national origin, sex, or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

(b) Age - In accordance with section 4 of the Age Discrimination in Employment Act of 1967, as amended, 29 U.S.C. § 623 and Federal transit law at 49 U.S.C. § 5332, the Contractor agrees to refrain from discrimination against present and prospective employees for reason of age. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

(c) Disabilities - In accordance with section 102 of the Americans with Disabilities Act, as amended, 42 U.S.C. § 12112, the Contractor agrees that it will comply with the requirements of U.S. Equal Employment Opportunity Commission, "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 C.F.R. Part 1630, pertaining to employment of persons with disabilities. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

(3) The Contractor also agrees to include these requirements in each subcontract financed in whole or in part with Federal assistance provided by FTA, modified only if necessary to identify the affected parties.

INCORPORATION OF FTA TERMS

The preceding provisions include, in part, certain Standard Terms and Conditions required by DOT, whether or not expressly set forth in the preceding contract provisions. All contractual provisions required by DOT, as set forth in FTA Circular 4220.1F are hereby incorporated by reference. Anything to the contrary herein notwithstanding, all FTA mandated terms shall be deemed to control in the event of a conflict with other provisions contained in this Agreement. The Contractor shall not perform any act, fail to perform any act, or refuse to comply with any City requests which would cause City to be in violation of the FTA terms and conditions.

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ENERGY CONSERVATION

The Contractor agrees to comply with mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act.

TERMINATION PROVISIONS

a. Termination for Convenience (General Provision) City may terminate this contract, in whole or in part, at any time by written notice to the Contractor when it is in the Government's best interest. The Contractor shall be paid its costs, including contract close-out costs, and profit on work performed up to the time of termination. The Contractor shall promptly submit its termination claim to City to be paid the Contractor. If the Contractor has any property in its possession belonging to City, the Contractor will account for the same, and dispose of it in the manner City directs.

b. Termination for Default [Breach or Cause] (General Provision) If the Contractor does not deliver supplies in accordance with the contract delivery schedule, or, if the contract is for services, the Contractor fails to perform in the manner called for in the contract, or if the Contractor fails to comply with any other provisions of the contract, City may terminate this contract for default. Termination shall be effected by serving a notice of termination on the contractor setting forth the manner in which the Contractor is in default. The contractor will only be paid the contract price for supplies delivered and accepted, or services performed in accordance with the manner of performance set forth in the contract. If it is later determined by City that the Contractor had an excusable reason for not performing, such as a strike, fire, or flood, events which are not the fault of or are beyond the control of the Contractor, City, after setting up a new delivery of performance schedule, may allow the Contractor to continue work, or treat the termination as a termination for convenience.

c. Opportunity to Cure (General Provision) City in its sole discretion may, in the case of a termination for breach or default, allow the Contractor an appropriate number of days in which to cure the defect. In such case, the notice of termination will state the time period in which cure is permitted and other appropriate conditions.

If Contractor fails to remedy to City's satisfaction the breach or default of any of the terms, covenants, or conditions of this Contract within the time period specified after receipt by Contractor of written notice from City setting forth the nature of said breach or default, City shall have the right to terminate the Contract without any further obligation to Contractor. Any such termination for default shall not in any way operate to preclude City from also pursuing all available remedies against Contractor and its sureties for said breach or default.

d. Waiver of Remedies for any Breach In the event that City elects to waive its remedies for any breach by Contractor of any covenant, term or condition of this Contract, such waiver by City shall not limit City's remedies for any succeeding breach of that or of any other term, covenant, or condition of this Contract.

e. Termination for Convenience (Professional or Transit Service Contracts) City, by written notice, may terminate this contract, in whole or in part, when it is in the Government's interest. If this contract is terminated, City shall be liable only for payment under the payment provisions of this contract for services rendered before the effective date of termination.

f. Termination for Default (Supplies and Service) If the Contractor fails to deliver supplies or to perform the services within the time specified in this contract or any extension or if the Contractor fails to comply with any other provisions of this contract, City may terminate this contract for default. City shall terminate by delivering to the Contractor a Notice of Termination specifying the nature of the default. The Contractor will only be paid the contract price for supplies delivered and accepted, or services performed in accordance with the manner or performance set forth in this contract.

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If, after termination for failure to fulfill contract obligations, it is determined that the Contractor was not in default, the rights and obligations of the parties shall be the same as if the termination had been issued for the convenience of City.

g. Termination for Default (Transportation Services) If the Contractor fails to pick up the commodities or to perform the services, including delivery services, within the time specified in this contract or any extension or if the Contractor fails to comply with any other provisions of this contract, City may terminate this contract for default. City shall terminate by delivering to the Contractor a Notice of Termination specifying the nature of default. The Contractor will only be paid the contract price for services performed in accordance with the manner of performance set forth in this contract.

If this contract is terminated while the Contractor has possession of City goods, the Contractor shall, upon direction of City, protect and preserve the goods until surrendered to City or its agent. The Contractor and City shall agree on payment for the preservation and protection of goods. Failure to agree on an amount will be resolved under the Dispute clause.

If, after termination for failure to fulfill contract obligations, it is determined that the Contractor was not in default, the rights and obligations of the parties shall be the same as if the termination had been issued for the convenience of City.

DEBARMENT AND SUSPENSION

This contract is a covered transaction for purposes of 49 CFR Part 29. As such, the contractor is required to verify that none of the contractor, its principals, as defined at 49 CFR 29.995, or affiliates, as defined at 49 CFR 29.905, are excluded or disqualified as defined at 49 CFR 29.940 and 29.945.

The contractor is required to comply with 49 CFR 29, Subpart C and must include the requirement to comply with 49 CFR 29, Subpart C in any lower tier covered transaction it enters into.

By signing and submitting its bid or proposal, the bidder or proposer certifies as follows:

The certification in this clause is a material representation of fact relied upon by City. If it is later determined that the bidder or proposer knowingly rendered an erroneous certification, in addition to remedies available to City, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment. The bidder or proposer agrees to comply with the requirements of 49 CFR 29, Subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

BUY AMERICA

The Contractor agrees to comply with 49 U.S.C. 5323(j) and 49 C.F.R. Part 661, which provide that Federal funds may not be obligated unless steel, iron, and manufactured products used in FTA-funded projects are produced in the United States, unless a waiver has been granted by FTA or the product is subject to a general waiver. A bidder or offeror must submit to the FTA recipient the appropriate Buy America certification (below) with all bids or offers on FTA-funded contracts, except those subject to a general waiver. Bids or offers that are not accompanied by a completed Buy America certification must be rejected as nonresponsive. This requirement does not apply to lower tier subcontractors.

Certification requirement for procurement of steel, iron, or manufactured products *(to be submitted with each bid or offer exceeding \$100,000)*.

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Certificate of Compliance with 49 U.S.C. 5323(j)(1)

The bidder or offeror hereby certifies that it will meet the requirements of 49 U.S.C. 5323(j)(1) and the applicable regulations in 49 CFR Part 661.5.

Date _____

Signature _____

Company Name _____

Title _____

Certificate of Non-Compliance with 49 U.S.C. 5323(j)(1)

The bidder or offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. 5323(j)(1) and 49 C.F.R. 661.5, but it may qualify for an exception pursuant to 49 U.S.C. 5323(j)(2)(A), 5323(j)(2)(B), or 5323(j)(2)(D), and 49 C.F.R. 661.7.

Date _____

Signature _____

Company Name _____

Title _____

PROVISIONS FOR RESOLUTION OF DISPUTES, BREACHES OR OTHER LITIGATION

Disputes - Disputes arising in the performance of this Contract which are not resolved by agreement of the parties shall be decided in writing by the authorized representative of City (Purchasing and Contracts Administrator). This decision shall be final and conclusive unless within ten (10) days from the date of receipt of its copy, the Contractor mails or otherwise furnishes a written appeal to the Purchasing and Contracts Administrator. In connection with any such appeal, the Contractor shall be afforded an opportunity to be heard and to offer evidence in support of its position. The decision of the Purchasing and Contracts Administrator shall be binding upon the Contractor and the Contractor shall abide by the decision.

Performance During Dispute - Unless otherwise directed by City, Contractor shall continue performance under the contract while matters in dispute are being resolved.

Claims for Damages - Should either party to the contract suffer injury or damage to person or property because of any act or omission of the party or of any of his employees, agents or others for whose acts he is legally liable, a claim for damages therefor shall be made in writing to such other party within a reasonable time after the first observance of such injury or damage.

Remedies - Unless this contract provides otherwise, all claims, counterclaims, disputes and other matters in question between City and Contractor arising out of or relating to this agreement or its breach will be decided by arbitration if the parties mutually agree, or in a court of competent jurisdiction within the State in which City is located.

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Rights and Remedies - The duties and obligations imposed by the contract documents and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law. No action or failure to act by City or Contractor shall constitute a waiver of any right or duty afforded any of them under the contract, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

LOBBYING

Contractors who apply or bid for an award of \$100,000 or more shall file the certification required by 49 CFR Part 20, "New Restrictions on Lobbying." Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier shall also disclose the name of any registrant under the Lobbying Disclosure Act of 1995 who has made lobbying contacts on its behalf with non-Federal funds with respect to that Federal contract, grant or award covered by 31 U.S.C. 1352. Such disclosures are forwarded from tier to tier up to City.

APPENDIX A, 49 CFR PART 20--CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements *(to be submitted with each bid or offer exceeding \$100,000)*.

The undersigned [Contractor] certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for making lobbying contacts to an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form--LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions [as amended by "Government wide Guidance for New Restrictions on Lobbying," 61 Fed. Reg. 1413 (1/19/96). Note: Language in paragraph (2) herein has been modified in accordance with Section 10 of the Lobbying Disclosure Act of 1995 (P.L. 104-65, to be codified at 2 U.S.C. 1601, *et seq.*.)]

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31, U.S.C. § 1352 (as amended by the Lobbying Disclosure Act of 1995). Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

[Note: Pursuant to 31 U.S.C. § 1352(c)(1)-(2)(A), any person who makes a prohibited expenditure or fails to file or amend a required certification or disclosure form shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such expenditure or failure.]

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The Contractor, _____, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. A 3801, *et seq.*, apply to this certification and disclosure, if any.

_____ Signature of Contractor's Authorized Official
Name/Title of Contractor's Authorized Official
Date

CLEAN AIR

(1) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. §§ 7401 *et seq.* The Contractor agrees to report each violation to the Purchaser and understands and agrees that the Purchaser will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.

(2) The Contractor also agrees to include these requirements in each subcontract exceeding \$100,000 financed in whole or in part with Federal assistance provided by FTA.

CLEAN WATER

(1) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 *et seq.* The Contractor agrees to report each violation to the Purchaser and understands and agrees that the Purchaser will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.

(2) The Contractor also agrees to include these requirements in each subcontract exceeding \$100,000 financed in whole or in part with Federal assistance provided by FTA.

DAVIS-BACON AND COPELAND ANTI-KICKBACK ACTS

(1) **Minimum wages** - (i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR Part 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classifications and wage rates conformed under paragraph (1)(ii) of this section) and the Davis-Bacon poster (WH-1321)

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shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) Except with respect to helpers as defined as 29 CFR 5.2(n)(4), the work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination; and

(4) With respect to helpers as defined in 29 CFR 5.2(n)(4), such a classification prevails in the area in which the work is performed.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(v)(A) The contracting officer shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional

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classification and wage rate and fringe benefits therefor only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination with 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(v) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(2) **Withholding** - The City shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, the City may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) **Payrolls and basic records** - (i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show

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that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the City for transmission to the Federal Transit Administration. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under section 5.5(a)(3)(i) of Regulations, 29 CFR part 5. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, DC 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be maintained under section 5.5(a)(3)(i) of Regulations, 29 CFR part 5 and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the Federal Transit Administration or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) **Apprentices and trainees** - (i) Apprentices - Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of

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probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator of the Wage and Hour Division of the U.S. Department of Labor determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees - Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity - The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) **Compliance with Copeland Act requirements** - The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

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(6) **Subcontracts** - The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the Federal Transit Administration may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) **Contract termination: debarment** - A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) **Compliance with Davis-Bacon and Related Act requirements** - All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) **Disputes concerning labor standards** - Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(10) **Certification of eligibility** - (i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

CONTRACT WORK HOURS & SAFETY STANDARDS ACT

(1) **Overtime requirements** - No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) **Violation; liability for unpaid wages; liquidated damages** - In the event of any violation of the clause set forth in paragraph (1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this section.

(3) **Withholding for unpaid wages and liquidated damages** - The City shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by

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the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this section.

(4) **Subcontracts** - The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs (1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this section.

BONDING

Bid Bond Requirements (Construction)

(a) Bid Security

A Bid Bond must be issued by a fully qualified surety company acceptable to City and listed as a company currently authorized under 31 CFR, Part 223 as possessing a Certificate of Authority as described thereunder.

(b) Rights Reserved

In submitting this Bid, it is understood and agreed by bidder that the right is reserved by City to reject any and all bids, or part of any bid, and it is agreed that the Bid may not be withdrawn for a period of [ninety (90)] days subsequent to the opening of bids, without the written consent of City.

It is also understood and agreed that if the undersigned bidder should withdraw any part or all of his bid within [ninety (90)] days after the bid opening without the written consent of City, shall refuse or be unable to enter into this Contract, as provided above, or refuse or be unable to furnish adequate and acceptable Performance Bonds and Labor and Material Payments Bonds, as provided above, or refuse or be unable to furnish adequate and acceptable insurance, as provided above, he shall forfeit his bid security to the extent of City's damages occasioned by such withdrawal, or refusal, or inability to enter into an agreement, or provide adequate security therefor.

It is further understood and agreed that to the extent the defaulting bidder's Bid Bond, Certified Check, Cashier's Check, Treasurer's Check, and/or Official Bank Check (excluding any income generated thereby which has been retained by City) shall prove inadequate to fully recompense City for the damages occasioned by default, then the undersigned bidder agrees to indemnify City and pay over to City the difference between the bid security and City's total damages, so as to make City whole.

The undersigned understands that any material alteration of any of the above or any of the material contained on this form, other than that requested, will render the bid unresponsive.

Performance and Payment Bonding Requirements (Construction)

The Contractor shall be required to obtain performance and payment bonds as follows:

(a) Performance bonds

1. The penal amount of performance bonds shall be 100 percent of the original contract price, unless the City determines that a lesser amount would be adequate for the protection of the City.

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2. The City may require additional performance bond protection when a contract price is increased. The increase in protection shall generally equal 100 percent of the increase in contract price. The City may secure additional protection by directing the Contractor to increase the penal amount of the existing bond or to obtain an additional bond.

(b) Payment bonds

1. The penal amount of the payment bonds shall equal:

(i) Fifty percent of the contract price if the contract price is not more than \$1 million.

(ii) Forty percent of the contract price if the contract price is more than \$1 million but not more than \$5 million; or

(iii) Two and one half million if the contract price is more than \$5 million.

2. If the original contract price is \$5 million or less, the City may require additional protection as required by subparagraph 1 if the contract price is increased.

Performance and Payment Bonding Requirements (Non-Construction)

The Contractor may be required to obtain performance and payment bonds when necessary to protect the City's interest.

(a) The following situations may warrant a performance bond:

1. City property or funds are to be provided to the contractor for use in performing the contract or as partial compensation (as in retention of salvaged material).

2. A contractor sells assets to or merges with another concern, and the City, after recognizing the latter concern as the successor in interest, desires assurance that it is financially capable.

3. Substantial progress payments are made before delivery of end items starts.

4. Contracts are for dismantling, demolition, or removal of improvements.

(b) When it is determined that a performance bond is required, the Contractor shall be required to obtain performance bonds as follows:

1. The penal amount of performance bonds shall be 100 percent of the original contract price, unless the City determines that a lesser amount would be adequate for the protection of the City.

2. The City may require additional performance bond protection when a contract price is increased. The increase in protection shall generally equal 100 percent of the increase in contract price. The City may secure additional protection by directing the Contractor to increase the penal amount of the existing bond or to obtain an additional bond.

(c) A payment bond is required only when a performance bond is required, and if the use of payment bond is in the City's interest.

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(d) When it is determined that a payment bond is required, the Contractor shall be required to obtain payment bonds as follows:

1. The penal amount of payment bonds shall equal:
 - (i) Fifty percent of the contract price if the contract price is not more than \$1 million;
 - (ii) Forty percent of the contract price if the contract price is more than \$1 million but not more than \$5 million; or
 - (iii) Two and one half million if the contract price is increased.

Advance Payment Bonding Requirements

The Contractor may be required to obtain an advance payment bond if the contract contains an advance payment provision and a performance bond is not furnished. The City shall determine the amount of the advance payment bond necessary to protect the City.

Patent Infringement Bonding Requirements (Patent Indemnity)

The Contractor may be required to obtain a patent indemnity bond if a performance bond is not furnished and the financial responsibility of the Contractor is unknown or doubtful. The City shall determine the amount of the patent indemnity to protect the City.

Warranty of the Work and Maintenance Bonds

1. The Contractor warrants to City, the Architect and/or Engineer that all materials and equipment furnished under this Contract will be of highest quality and new unless otherwise specified by City, free from faults and defects and in conformance with the Contract Documents. All work not so conforming to these standards shall be considered defective. If required by the Project Manager, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.
2. The Work furnished must be of first quality and the workmanship must be the best obtainable in the various trades. The Work must be of safe, substantial and durable construction in all respects. The Contractor hereby guarantees the Work against defective materials or faulty workmanship for a minimum period of one (1) year after Final Payment by City and shall replace or repair any defective materials or equipment or faulty workmanship during the period of the guarantee at no cost to City. As additional security for these guarantees, the Contractor shall, prior to the release of Final Payment, furnish separate Maintenance (or Guarantee) Bonds in form acceptable to City written by the same corporate surety that provides the Performance Bond and Labor and Material Payment Bond for this Contract. These bonds shall secure the Contractor's obligation to replace or repair defective materials and faulty workmanship for a minimum period of one (1) year after Final Payment and shall be written in an amount equal to ONE HUNDRED PERCENT (100%) of the CONTRACT SUM, as adjusted (if at all).

SEISMIC SAFETY

The contractor agrees that any new building or addition to an existing building will be designed and constructed in accordance with the standards for Seismic Safety required in Department of Transportation Seismic Safety Regulations 49 CFR Part 41 and will certify to compliance to the extent required by the regulation. The contractor also agrees to ensure that all work performed under this contract including work performed by a subcontractor is in compliance with the standards required by the Seismic Safety Regulations and the certification of compliance issued on the project.

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DISADVANTAGED BUSINESS ENTERPRISES (DBEs)

- a. This contract is subject to the requirements of Title 49, Code of Federal Regulations, Part 26, *Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs*. The national goal for participation of Disadvantaged Business Enterprises (DBE) is 10%. The agency's overall goal for DBE participation is 0.34%. A separate contract goal has not been established for this project.
- b. The contractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of this DOT-assisted contract. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as City deems appropriate. Each subcontract the contractor signs with a subcontractor must include the assurance in this paragraph (see 49 CFR 26.13(b)).
- c. The successful bidder/Proposer will be required to report its DBE participation obtained through race-neutral means throughout the period of performance.
- d. The contractor is required to pay its subcontractors performing work related to this contract for satisfactory performance of that work no later than 30 days after the contractor's receipt of payment for that work from City. In addition, the contractor may not hold retainage from its subcontractors.
- e. The contractor must promptly notify City whenever a DBE subcontractor performing work related to this contract is terminated or fails to complete its work, and must make good faith efforts to engage another DBE subcontractor to perform at least the same amount of work. The contractor may not terminate any DBE subcontractor and perform that work through its own forces or those of an affiliate without prior written consent of City.

ADA ACCESS

The Contractor agrees to comply with 49 CFR Part 27, the purpose of which is to carry out the intent of section 504 of the Rehabilitation Act of 1973 (29 U.S.C. 794) as amended, to the end that no otherwise qualified individual with a disability in the United States shall, solely by reason of his or her disability, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.

The Contractor shall ensure that the design, construction or alteration of buildings or other fixed facilities by the City – a recipient of Federal financial assistance from the Department of Transportation – shall be in conformance with 49 CFR Part 27.