STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

Division of Facilities Construction and Management

DFCM

STANDARD LOW BID PROJECT

November 9, 2007

RESTROOM REMODEL
DEAD HORSE POINT STATE PARK

DIVISION OF PARKS AND RECREATION
MOAB, UTAH

DFCM Project Number 07321510

P + A Architects & Associates
821 East Kensington Ave
Salt Lake City, Utah 84105

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Current copies of the following documents are hereby made part of these contract documents by reference. These documents are available on the DFCM web site at http://dfcm.utah.gov or are available upon request from DFCM.

DFCM General Conditions dated May 25, 2005.
DFCM Application and Certification for Payment dated May 25, 2005.

Technical Specifications :
Drawings:

The Agreement and General Conditions dated May 25, 2005 have been updated from versions that were formally adopted and in use prior to this date. The changes made to the General Conditions are identified in a document entitled Revisions to General Conditions that is available on DFCM's web site at http://dfcm.utah.gov

NOTICE TO CONTRACTORS

Sealed bids will be received by the Division of Facilities Construction and Management (DFCM) for:

RESTROOM REMODEL - DEAD HORSE POINT STATE PARK
DIVISION OF PARKS AND RECREATION – MOAB, UTAH
DFCM PROJECT NO: 07321510

Bids will be in accordance with the Contract Documents that will be available at 2:00 PM on Friday, November 9, 2007 and distributed in electronic format only on CDs from DFCM, 4110 State Office Building, Salt Lake City, Utah and on the DFCM web page at http://dfcm.utah.gov. For questions regarding this project, please contact Michael Ambre, DFCM, at 801-209-9104. No others are to be contacted regarding this bidding process. The construction budget for this project is $330,000.

A **mandatory** pre-bid meeting will be held at 11:00 AM on Thursday, November 15, 2007 at Dead Horse Point State Park (SR 313 18 miles off Hwy 191 near Moab, Utah). Meet at the Visitor's Center. All bidders wishing to bid on this project are required to attend this meeting.

Bids will be received until the hour of 3:00 PM on Tuesday, December 4, 2007 at DFCM, 4ll0 State Office Building, Salt Lake City, Utah 84114. Bids will be opened and read aloud in the DFCM Conference Room, 4110 State Office Building, Salt Lake City, Utah. NOTE: Bids must be received at 4110 State Office Building by the specified time.

A bid bond in the amount of five percent (5%) of the bid amount, made payable to the Division of Facilities Construction and Management on DFCM's bid bond form, shall accompany the bid.

The Division of Facilities Construction and Management reserves the right to reject any or all bids or to waive any formality or technicality in any bid in the interest of DFCM.

DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT
Marla Workman, Contract Coordinator
4110 State Office Building, Salt Lake City, Utah 84114

PROJECT DESCRIPTION

This project will include two restrooms - one will be located at the point and the other in the camp ground area. These are stick frame, EFIS buildings including both male and female sections. Each section contains four toilets/urinals plus sink area.

PROJECT SCHEDULE

PROJECT NAME:	**RESTROOM REMODEL - DEAD HORSE POINT STATE PARK DIVISION OF PARKS AND RECREATION – MOAB, UTAH**
DFCM PROJECT NO.	**07321510**

Event	Day	Date	Time	Place
Bidding Documents Available	Friday	November 9, 2007	2:00 PM	DFCM 4110 State Office Bldg SLC, UT and the DFCM web site *
Mandatory Pre-bid Site Meeting	Thursday	November 15, 2007	11:00 AM	Visitor's Center Dead Horse Point State Park (SR 313 18 miles off Hwy 191 near Moab, Utah)
Last Day to Submit Questions	Wednesday	November 21, 2007	12:00 NOON	Michael Ambre – DFCM E-mail mambre@utah.gov Fax 801-538-3267
Addendum Deadline (exception for bid delays)	Wednesday	November 28, 2007	2:00 PM	DFCM web site *
Prime Contractors Turn In Bid and Bid Bond	Tuesday	December 4, 2007	3:00 PM	DFCM 4110 State Office Bldg SLC, UT
Sub-contractor List Due	Wednesday	December 5, 2007	3:00 PM	DFCM 4110 State Office Bldg SLC, UT Fax 801-538-3677
Substantial Completion Date	Friday	May 30, 2008	5:00 PM	

* **NOTE: DFCM's web site address is http://dfcm.utah.gov**

BID FORM

NAME OF BIDDER _____ DATE _____

To the Division of Facilities Construction and Management
4110 State Office Building
Salt Lake City, Utah 84114

The undersigned, responsive to the "Notice to Contractors" and in accordance with the "Instructions to Bidders", in compliance with your invitation for bids for the **RESTROOM REMODEL - DEAD HORSE POINT STATE PARK – DIVISION OF PARKS AND RECREATION – MOAB, UTAH – DFCM PROJECT NO. 07321510** and having examined the Contract Documents and the site of the proposed Work and being familiar with all of the conditions surrounding the construction of the proposed Project, including the availability of labor, hereby proposes to furnish all labor, materials and supplies as required for the Work in accordance with the Contract Documents as specified and within the time set forth and at the price stated below. This price is to cover all expenses incurred in performing the Work required under the Contract Documents of which this bid is a part:

I/We acknowledge receipt of the following Addenda: _____

For all work shown on the Drawings and described in the Specifications and Contract Documents, I/we agree to perform for the sum of:

_____ DOLLARS ($_____)
(In case of discrepancy, written amount shall govern)

I/We guarantee that the Work will be Substantially Complete by **May 30,2008**, should I/we be the successful bidder, and agree to pay liquidated damages in the amount of **$350.00** per day for each day after expiration of the Contract Time as stated in Article 3 of the Contractor's Agreement.

This bid shall be good for 45 days after bid opening.

Enclosed is a 5% bid bond, as required, in the sum of _____

The undersigned Contractor's License Number for Utah is _____._____

Upon receipt of notice of award of this bid, the undersigned agrees to execute the contract within ten (10) days, unless a shorter time is specified in the Contract Documents, and deliver acceptable Performance and Payment bonds in the prescribed form in the amount of 100% of the Contract Sum for faithful performance of the contract.

The Bid Bond attached, in the amount not less than five percent (5%) of the above bid sum, shall become the property of the Division of Facilities Construction and Management as liquidated damages for delay and additional expense caused thereby in the event that the contract is not executed and/or acceptable l00% Performance and Payment bonds are not delivered within the time set forth.

Type of Organization:

_____
(Corporation, Partnership, Individual, etc.)

Any request and information related to Utah Preference Laws:

_____

Respectfully submitted,

_____
Name of Bidder

ADDRESS:

_____

_____

_____
Authorized Signature

INSTRUCTIONS TO BIDDERS

1. Drawings and Specifications, Other Contract Documents

Drawings and Specifications, as well as other available Contract Documents, may be obtained as stated in the Invitation to Bid.

2. Bids

Before submitting a bid, each contractor shall carefully examine the Contract Documents, shall visit the site of the Work; shall fully inform themselves as to all existing conditions and limitations; and shall include in the bid the cost of all items required by the Contract Documents. If the bidder observes that portions of the Contract Documents are at variance with applicable laws, building codes, rules, regulations or contain obvious erroneous or uncoordinated information, the bidder shall promptly notify the DFCM Representative and the necessary changes shall be accomplished by Addendum.

The bid, bearing original signatures, must be typed or handwritten in ink on the Bid Form provided in the procurement documents and submitted in a sealed envelope at the location specified by the Invitation to Bid prior to the deadline for submission of bids.

Bid bond security, in the amount of five percent (5%) of the bid, made payable to the Division of Facilities Construction and Management, shall accompany bid. THE BID BOND MUST BE ON THE BID BOND FORM PROVIDED IN THE PROCUREMENT DOCUMENTS IN ORDER TO BE CONSIDERED AN ACCEPTABLE BID.

If the bid bond security is submitted on a bid bond form other than DFCM's required bid bond form, and the bid security meets all other legal requirements, the bidder will be allowed to provide an acceptable bid bond by the close of business on the next business day following notification by DFCM of submission of a defective bid bond security. **NOTE: A cashier's check cannot be used as a substitute for a bid bond.**

3. Contract and Bond

The Contractor's Agreement will be in the form found in the specifications. The Contract Time will be as indicated in the bid. The successful bidder, simultaneously with the execution of the Contract Agreement, will be required to furnish a performance bond and a payment bond, both bearing original signatures, upon the forms provided in the procurement documents. The performance and payment bonds shall be for an amount equal to one hundred percent (100%) of the contract sum and secured from a company that meets the requirements specified in the requisite forms. Any bonding requirements for subcontractors will be specified in the Supplementary General Conditions.

4. Listing of Subcontractors

Listing of Subcontractors shall be as summarized in the "Instructions and Subcontractor's List Form", which are included as part of these Contract Documents. The Subcontractors List shall be delivered to DFCM or faxed to DFCM at (801)538-3677 within 24 hours of the bid opening. Requirements for listing additional subcontractors will be listed in the Contract Documents.

DFCM retains the right to audit or take other steps necessary to confirm compliance with requirements for the listing and changing of subcontractors. Any contractor who is found to not be in compliance with these requirements is subject to a debarment hearing and may be debarred from consideration for award of contracts for a period of up to three years.

5. Interpretation of Drawings and Specifications

If any person or entity contemplating submitting a bid is in doubt as to the meaning of any part of the drawings, specifications or other Contract Documents, such person shall submit to the DFCM Project Manager a request for an interpretation thereof. The person or entity submitting the request will be responsible for its prompt delivery. Any interpretation of the proposed documents will be made only by addenda posted on DFCM's web site at http://dfcm.utah.gov. Neither the DFCM nor A/E will be responsible for any other explanations or interpretations of the proposed documents. A/E shall be deemed to refer to the architect or engineer hired by DFCM as the A/E or Consultant for the Project.

6. Addenda

Addenda will be posted on DFCM's web site at http://dfcm.utah.gov. Contractors are responsible for obtaining information contained in each addendum from the web site. Addenda issued prior to the submittal deadline shall become part of the bidding process and must be acknowledged on the bid form. Failure to acknowledge addenda may result in disqualification from bidding.

7. Award of Contract

The Contract will be awarded as soon as possible to the lowest, responsive and responsible bidder, based on the lowest combination of base bid and acceptable prioritized alternates, provided the bid is reasonable, is in the interests of the State of Utah to accept and after applying the Utah Preference Laws in U.C.A. Title 63, Chapter 56. DFCM reserves the right to waive any technicalities or formalities in any bid or in the bidding. Alternates will be accepted on a prioritized basis with Alternate 1 being highest priority, Alternate 2 having second priority, etc.

8. DFCM Contractor Performance Rating

As a contractor completes each DFCM project, DFCM, the architect/engineer and the using agency will evaluate project performance based on the enclosed "DFCM Contractor Performance Rating" form. The ratings issued on this project will not affect this project but may affect the award on future projects.

9. Licensure

The Contractor shall comply with and require all of its subcontractors to comply with the license laws as required by the State of Utah.

10. Permits

In concurrence with the requirements for permitting in the General Conditions, it is the responsibility of the Contractor to obtain the fugitive dust plan requirements from the Utah Division of Air Quality and the SWPPP requirements from the Utah Department of Environmental Quality and submit the completed forms and pay any permit fee that may be required for this specific project. Failure to obtain the required permit may result in work stoppage and/or fines from the regulating authority that will be the sole responsibility of the Contractor. Any delay to the project as a result of any such failure to obtain the permit or noncompliance with the permit shall not be eligible for any extension in the Contract Time.

11. Right to Reject Bids

DFCM reserves the right to reject any or all Bids.

12. Time is of the Essence

Time is of the essence in regard to all the requirements of the Contract Documents.

13. Withdrawal of Bids

Bids may be withdrawn on written request received from bidder prior to the time fixed for opening. Negligence on the part of the bidder in preparing the bid confers no right for the withdrawal of the bid after it has been opened.

14. Product Approvals

Where reference is made to one or more proprietary products in the Contract Documents, but restrictive descriptive materials of one or more manufacturer(s) is referred to in the Contract Documents, the products of other manufacturers will be accepted, provided they equal or exceed the standards set forth in the drawings and specifications and are compatible with the intent and purpose of

the design, subject to the written approval of the A/E. Such written approval must occur prior to the deadline established for the last scheduled addenda to be issued. The A/E's written approval will be in an issued addendum. If the descriptive material is not restrictive, the products of other manufacturers specified will be accepted without prior approval provided they are compatible with the intent and purpose of the design as determined by the A/E.

15. Financial Responsibility of Contractors, Subcontractors and Sub-subcontractors

Contractors shall respond promptly to any inquiry in writing by DFCM to any concern of financial responsibility of the contractor, subcontractor or sub-subcontractor.

16. Debarment

By submitting a bid, the Contractor certifies that neither it nor its principals, including project and site managers, have been, or are under consideration for, debarment or suspension, or any action that would exclude such from participation in a construction contract by any governmental department or agency. If the Contractor cannot certify this statement, attach to the bid a detailed written explanation which must be reviewed and approved by DFCM as part of the requirements for award of the Project.

BID BOND

(Title 63, Chapter 56, U. C. A. l953, as Amended)

KNOW ALL PERSONS BY THESE PRESENTS:

That _____ hereinafter referred to as the "Principal," and_____, a corporation organized and existing under the laws of the State of _____, with its principal office in the City of _____ and authorized to transact business in this State and U. S. Department of the Treasury Listed, (Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies); hereinafter referred to as the "Surety," are held and firmly bound unto the STATE OF UTAH, hereinafter referred to as the "Obligee," in the amount of $_____ (5% of the accompanying bid), being the sum of this Bond to which payment the Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the Principal has submitted to Obligee the accompanying bid incorporated by reference herein, dated as shown, to enter into a contract in writing for the_____ _____ Project.

NOW, THEREFORE, THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, that if the said principal does not execute a contract and give bond to be approved by the Obligee for the faithful performance thereof within ten (10) days after being notified in writing of such contract to the principal, then the sum of the amount stated above will be forfeited to the State of Utah as liquidated damages and not as a penalty; if the said principal shall execute a contract and give bond to be approved by the Obligee for the faithful performance thereof within ten (10) days after being notified in writing of such contract to the Principal, then this obligation shall be null and void. It is expressly understood and agreed that the liability of the Surety for any and all defaults of the Principal hereunder shall be the full penal sum of this Bond. The Surety, for value received, hereby stipulates and agrees that obligations of the Surety under this Bond shall be for a term of sixty (60) days from actual date of the bid opening.

PROVIDED, HOWEVER, that this Bond is executed pursuant to provisions of Title 63, Chapter 56, Utah Code Annotated, 1953, as amended, and all liabilities on this Bond shall be determined in accordance with said provisions to same extent as if it were copied at length herein.

IN WITNESS WHEREOF, the above bounden parties have executed this instrument under their several seals on the date indicated below, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

DATED this _____ day of _____, 20_____ .

Principal's name and address (if other than a corporation):

_____

_____

By:_____

Title: _____

Principal's name and address (if a corporation):

_____

_____

By:_____

Title: _____

(Affix Corporate Seal)

Surety's name and address:

_____

_____

By: _____

Attorney-in-Fact (Affix Corporate Seal)

STATE OF _____)
) ss.
COUNTY OF _____)

On this ____ day of _____, 20_____, personally appeared before me _____, whose identity is personally known to me or proved to me on the basis of satisfactory evidence, and who, being by me duly sworn, did say that he/she is the Attorney-in-fact of the above-named Surety Company, and that he/she is duly authorized to execute the same and has complied in all respects with the laws of Utah in reference to becoming sole surety upon bonds, undertakings and obligations, and that he/she acknowledged to me that as Attorney-in-fact executed the same.

Subscribed and sworn to before me this _____ day of _____, 20_____.
My Commission Expires: _____
Resides at: _____

_____
NOTARY PUBLIC

Agency: _____
Agent: _____
Address: _____
Phone: _____

Approved As To Form: May 25, 2005
By Alan S. Bachman, Asst Attorney General

INSTRUCTIONS AND SUBCONTRACTORS LIST FORM

The three low bidders, as well as all other bidders that desire to be considered, are required by law to submit to DFCM within 24 hours of bid opening a list of **ALL** first-tier subcontractors, including the subcontractor's name, bid amount and other information required by Building Board Rule and as stated in these Contract Documents, based on the following:

DOLLAR AMOUNTS FOR LISTING

PROJECTS UNDER $500,000: ALL FIRST-TIER SUBS $20,000 OR OVER MUST BE LISTED
PROJECTS $500,000 OR MORE: ALL FIRST-TIER SUBS $35,000 OR OVER MUST BE LISTED

- Any additional subcontractors identified in the bid documents shall also be listed.
- The DFCM Director may not consider any bid submitted by a bidder if the bidder fails to submit a subcontractor list meeting the requirements of State law.
- List subcontractors for base bid as well as the impact on the list that the selection of any alternate may have.
- Bidder may not list more than one subcontractor to perform the same work.
- If there are no subcontractors for the job that are required to be reported by State law (either because there are no subcontractors that will be used on the project or because there are no first-tier subcontractors over the dollar amounts referred to above), then you do not need to submit a sublist. If you do not submit a sublist, it will be deemed to be a representation by you that there are no subcontractors on the job that are required to be reported under State law. At any time, DFCM reserves the right to inquire, for security purposes, as to the identification of the subcontractors at any tier that will be on the worksite.

LICENSURE:

The subcontractor's name, the type of work, the subcontractor's bid amount, and the subcontractor's license number as issued by DOPL, if such license is required under Utah Law, shall be listed. Bidder shall certify that all subcontractors, required to be licensed, are licensed as required by State law. A subcontractor includes a trade contractor or specialty contractor and does not include suppliers who provide only materials, equipment, or supplies to a contractor or subcontractor.

'SPECIAL EXCEPTION':

A bidder may list 'Special Exception' in place of a subcontractor when the bidder intends to obtain a subcontractor to perform the work at a later date because the bidder was unable to obtain a qualified or reasonable bid under the provisions of U.C.A.Section 63A-5-208(4). The bidder shall insert the term 'Special Exception' for that category of work, and shall provide documentation with the subcontractor list describing the bidder's efforts to obtain a bid of a qualified subcontractor at a reasonable cost and why the bidder was unable to obtain a qualified subcontractor bid. The Director must find that the bidder complied in good faith with State law requirements for any 'Special Exception' designation, in order for the bid to be considered. If awarded the contract, the Director shall supervise the bidder's efforts to obtain a qualified subcontractor bid. The amount of the awarded contract may not be adjusted to reflect the actual amount of the subcontractor's bid. Any listing of 'Special Exception' on the sublist form shall also include amount allocated for that work.

GROUNDS FOR DISQUALIFICATION:

The Director may not consider any bid submitted by a bidder if the bidder fails to submit a subcontractor list meeting the requirements of State law. Director may withhold awarding the contract to a particular bidder if one or more of the proposed subcontractors are considered by the Director to be unqualified to do the Work or for

such other reason in the best interest of the State of Utah. Notwithstanding any other provision in these instructions, if there is a good faith error on the sublist form, at the sole discretion of the Director, the Director may provide notice to the contractor and the contractor shall have 24 hours to submit the correction to the Director. If such correction is submitted timely, then the sublist requirements shall be considered met.

CHANGES OF SUBCONTRACTORS SPECIFICALLY IDENTIFIED ON SUBLIST FORM:

Subsequent to twenty-four hours after the bid opening, the contractor may change its listed subcontractors only after receiving written permission from the Director based on complying with all of the following criteria.

(1) The contractor has established in writing that the change is in the best interest of the State and that the contractor establishes an appropriate reason for the change, which may include, but not is not limited to, the following reasons: the original subcontractor has failed to perform, or is not qualified or capable of performing, and/or the subcontractor has requested in writing to be released.
(2) The circumstances related to the request for the change do not indicate any bad faith in the original listing of the subcontractors.
(3) Any requirement set forth by the Director to ensure that the process used to select a new subcontractor does not give rise to bid shopping.
(4) Any increase in the cost of the subject subcontractor work is borne by the contractor.
(5) Any decrease in the cost of the subject subcontractor work shall result in a deductive change order being issued for the contract for such decreased amount.
(6) The Director will give substantial weight to whether the subcontractor has consented in writing to being removed unless the Contractor establishes that the subcontractor is not qualified for the work.

EXAMPLE:

Example of a list where there are only four subcontractors:

TYPE OF WORK	SUBCONTRACTOR, "SELF" OR "SPECIAL EXCEPTION"	SUBCONTRACTOR BID AMOUNT	CONTRACTOR LICENSE #
ELECTRICAL	ABCD Electric Inc.	$350,000.00	123456789000
LANDSCAPING	"Self" *	$300,000.00	123456789000
CONCRETE (ALTERNATE #1)	XYZ Concrete Inc	$298,000.00	987654321000
MECHANICAL	"Special Exception" (attach documentation)	Fixed at: $350,000.00	(TO BE PROVIDED AFTER OBTAINING SUBCONTRACTOR)

* Bidders may list "self", but it is not required.

PURSUANT TO STATE LAW - SUBCONTRACTOR BID AMOUNTS CONTAINED IN THIS SUBCONTRACTOR LIST SHALL NOT BE DISCLOSED UNTIL THE CONTRACT HAS BEEN AWARDED.

SUBCONTRACTORS LIST

FAX TO 801-538-3677

PROJECT TITLE: _____

Caution: You must read and comply fully with instructions.

TYPE OF WORK	SUBCONTRACTOR, "SELF" OR "SPECIAL EXCEPTION"	SUBCONTRACTOR BID AMOUNT	CONT. LICENSE #

We certify that:

1. This list includes all subcontractors as required by the instructions, including those related to the base bid as well as any alternates.
2. We have listed "Self" or "Special Exception" in accordance with the instructions.
3. All subcontractors are appropriately licensed as required by State law.

FIRM: _____

DATE: _____ SIGNED BY: _____

NOTICE: FAILURE TO SUBMIT THIS FORM, PROPERLY COMPLETED AND SIGNED, AS REQUIRED IN THESE CONTRACT DOCUMENTS, SHALL BE GROUNDS FOR OWNER'S REFUSAL TO ENTER INTO A WRITTEN CONTRACT WITH BIDDER. ACTION MAY BE TAKEN AGAINST BIDDERS BID BOND AS DEEMED APPROPRIATE BY OWNER. ATTACH A SECOND PAGE IF NECESSARY.

CONTRACTOR'S AGREEMENT

FOR:

_____
_____
_____

THIS CONTRACTOR'S AGREEMENT, made and entered into this ____ day of _____, 20__, by and between the DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT, hereinafter referred to as "DFCM", and _____, incorporated in the State of _____ and authorized to do business in the State of Utah, hereinafter referred to as "Contractor", whose address is _____.

WITNESSETH: WHEREAS, DFCM intends to have Work performed at _____ _____.

WHEREAS, Contractor agrees to perform the Work for the sum stated herein.

NOW, THEREFORE, DFCM and Contractor for the consideration provided in this Contractor's Agreement, agree as follows:

ARTICLE 1. SCOPE OF WORK. The Work to be performed shall be in accordance with the Contract Documents prepared by _____ and entitled "_____."

The DFCM General Conditions ("General Conditions") dated May 25, 2005 on file at the office of DFCM and available on the DFCM website, are hereby incorporated by reference as part of this Agreement and are included in the specifications for this Project. All terms used in this Contractor's Agreement shall be as defined in the Contract Documents, and in particular, the General Conditions.

The Contractor Agrees to furnish labor, materials and equipment to complete the Work as required in the Contract Documents which are hereby incorporated by reference. It is understood and agreed by the parties hereto that all Work shall be performed as required in the Contract Documents and shall be subject to inspection and approval of DFCM or its authorized representative. The relationship of the Contractor to the DFCM hereunder is that of an independent Contractor.

ARTICLE 2. CONTRACT SUM. The DFCM agrees to pay and the Contractor agrees to accept in full performance of this Contractor's Agreement, the sum of _____ _____ DOLLARS AND NO CENTS ($_____.00), which is the base bid, and which sum also includes the cost of a 100% Performance Bond and a 100%

Payment Bond as well as all insurance requirements of the Contractor. Said bonds have already been posted by the Contractor pursuant to State law. The required proof of insurance certificates have been delivered to DFCM in accordance with the General Conditions before the execution of this Contractor's Agreement.

ARTICLE 3. TIME OF COMPLETION AND DELAY REMEDY. The Work shall be Substantially Complete by _____. Contractor agrees to pay liquidated damages in the amount of $_____ per day for each day after expiration of the Contract Time until the Contractor achieves Substantial Completion in accordance with the Contract Documents, if Contractor's delay makes the damages applicable. The provision for liquidated damages is: (a) to compensate the DFCM for delay only; (b) is provided for herein because actual damages can not be readily ascertained at the time of execution of this Contractor's Agreement; (c) is not a penalty; and (d) shall not prevent the DFCM from maintaining Claims for other non-delay damages, such as costs to complete or remedy defective Work.

No action shall be maintained by the Contractor, including its or Subcontractor or suppliers at any tier, against the DFCM or State of Utah for damages or other claims due to losses attributable to hindrances or delays from any cause whatsoever, including acts and omissions of the DFCM or its officers, employees or agents, except as expressly provided in the General Conditions. The Contractor may receive a written extension of time, signed by the DFCM, in which to complete the Work under this Contractor's Agreement in accordance with the General Conditions.

ARTICLE 4. CONTRACT DOCUMENTS. The Contract Documents consist of this Contractor's Agreement, the Conditions of the Contract (DFCM General Conditions, Supplementary and other Conditions), the Drawings, Specifications, Addenda and Modifications. The Contract Documents shall also include the bidding documents, including the Invitation to Bid, Instructions to Bidders/ Proposers and the Bid/Proposal, to the extent not in conflict therewith and other documents and oral presentations that are documented as an attachment to the contract.

All such documents are hereby incorporated by reference herein. Any reference in this Contractor's Agreement to certain provisions of the Contract Documents shall in no way be construed as to lessen the importance or applicability of any other provisions of the Contract Documents.

ARTICLE 5. PAYMENT. The DFCM agrees to pay the Contractor from time to time as the Work progresses, but not more than once each month after the date of Notice to Proceed, and only upon Certificate of the A/E for Work performed during the preceding calendar month, ninety-five percent (95%) of the value of the labor performed and ninety-five percent (95%) of the value of materials furnished in place or on the site. The Contractor agrees to furnish to the DFCM invoices for materials purchased and on the site but not installed, for which the Contractor requests payment and agrees to

safeguard and protect such equipment or materials and is responsible for safekeeping thereof and if such be stolen, lost or destroyed, to replace same.

Such evidence of labor performed and materials furnished as the DFCM may reasonably require shall be supplied by the Contractor at the time of request for Certificate of Payment on account. Materials for which payment has been made cannot be removed from the job site without DFCM's written approval. Five percent (5%) of the earned amount shall be retained from each monthly payment. The retainage, including any additional retainage imposed and the release of any retainage, shall be in accordance with UCA 13-8-5 as amended. Contractor shall also comply with the requirements of UCA 13-8-5, including restrictions of retainage regarding subcontractors and the distribution of interest earned on the retention proceeds. The DFCM shall not be responsible for enforcing the Contractor's obligations under State law in fulfilling the retention law requirements with subcontractors at any tier.

ARTICLE 6. INDEBTEDNESS. Before final payment is made, the Contractor must submit evidence satisfactory to the DFCM that all payrolls, materials bills, subcontracts at any tier and outstanding indebtedness in connection with the Work have been properly paid. Final Payment will be made after receipt of said evidence, final acceptance of the Work by the DFCM as well as compliance with the applicable provisions of the General Conditions.

Contractor shall respond immediately to any inquiry in writing by DFCM as to any concern of financial responsibility and DFCM reserves the right to request any waivers, releases or bonds from Contractor in regard to any rights of Subcontractors (including suppliers) at any tier or any third parties prior to any payment by DFCM to Contractor.

ARTICLE 7. ADDITIONAL WORK. It is understood and agreed by the parties hereto that no money will be paid to the Contractor for additional labor or materials furnished unless a new contract in writing or a Modification hereof in accordance with the General Conditions and the Contract Documents for such additional labor or materials has been executed. The DFCM specifically reserves the right to modify or amend this Contractor's Agreement and the total sum due hereunder either by enlarging or restricting the scope of the Work.

ARTICLE 8. INSPECTIONS. The Work shall be inspected for acceptance in accordance with the General Conditions.

ARTICLE 9. DISPUTES. Any dispute, PRE or Claim between the parties shall be subject to the provisions of Article 7 of the General Conditions. DFCM reserves all rights to pursue its rights and remedies as provided in the General Conditions.

ARTICLE 10. TERMINATION, SUSPENSION OR ABANDONMENT. This Contractor's Agreement may be terminated, suspended or abandoned in accordance with the General Conditions.

ARTICLE 11. DFCM'S RIGHT TO WITHHOLD CERTAIN AMOUNT AND MAKE USE THEREOF. The DFCM may withhold from payment to the Contractor such amount as, in DFCM's judgment, may be necessary to pay just claims against the Contractor or Subcontractor at any tier for labor and services rendered and materials furnished in and about the Work. The DFCM may apply such withheld amounts for the payment of such claims in DFCM's discretion. In so doing, the DFCM shall be deemed the agent of Contractor and payment so made by the DFCM shall be considered as payment made under this Contractor's Agreement by the DFCM to the Contractor. DFCM shall not be liable to the Contractor for any such payment made in good faith. Such withholdings and payments may be made without prior approval of the Contractor and may be also be prior to any determination as a result of any dispute, PRE, Claim or litigation.

ARTICLE 12. INDEMNIFICATION. The Contractor shall comply with the indemnification provisions of the General Conditions.

ARTICLE 13. SUCCESSORS AND ASSIGNMENT OF CONTRACT. The DFCM and Contractor, respectively bind themselves, their partners, successors, assigns and legal representatives to the other party to this Agreement, and to partners, successors, assigns and legal representatives of such other party with respect to all covenants, provisions, rights and responsibilities of this Contractor’s Agreement. The Contractor shall not assign this Contractor’s Agreement without the prior written consent of the DFCM, nor shall the Contractor assign any moneys due or to become due as well as any rights under this Contractor’s Agreement, without prior written consent of the DFCM.

ARTICLE 14. RELATIONSHIP OF THE PARTIES. The Contractor accepts the relationship of trust and confidence established by this Contractor's Agreement and covenants with the DFCM to cooperate with the DFCM and A/E and use the Contractor's best skill, efforts and judgment in furthering the interest of the DFCM; to furnish efficient business administration and supervision; to make best efforts to furnish at all times an adequate supply of workers and materials; and to perform the Work in the best and most expeditious and economic manner consistent with the interests of the DFCM.

ARTICLE 15. AUTHORITY TO EXECUTE AND PERFORM AGREEMENT. Contractor and DFCM each represent that the execution of this Contractor's Agreement and the performance thereunder is within their respective duly authorized powers.

ARTICLE 16. ATTORNEY FEES AND COSTS. Except as otherwise provided in the dispute resolution provisions of the General Conditions, the prevailing party shall be entitled to reasonable attorney fees and costs incurred in any action in the District Court and/or appellate body to enforce this Contractor's Agreement or recover damages or any other action as a result of a breach thereof.

IN WITNESS WHEREOF, the parties hereto have executed this Contractor's Agreement on the day and year stated hereinabove.

CONTRACTOR: _____

_____
Signature Date

Title: _____

State of _____)
)
County of _____)

_____
Please type/print name clearly

On this ____ day of _____, 20____, personally appeared before me, _____, whose identity is personally known to me (or proved to me on the basis of satisfactory evidence) and who by me duly sworn (or affirmed), did say that he (she) is the _____ (title or office) of the firm and that said document was signed by him (her) in behalf of said firm.

_____
Notary Public

(SEAL)

My Commission Expires _____

APPROVED AS TO AVAILABILITY
OF FUNDS:

_____
David D. Williams, Jr. Date
DFCM Administrative Services Director

DIVISION OF FACILITIES
CONSTRUCTION AND MANAGEMENT

_____
_____- Manager Date
Capital Development/Improvements

APPROVED AS TO FORM:
ATTORNEY GENERAL
November 30, 2006
By: Alan S. Bachman
Asst Attorney General

APPROVED FOR EXPENDITURE:

_____
Division of Finance Date

PERFORMANCE BOND

(Title 63, Chapter 56, U. C. A. 1953, as Amended)

That _____ hereinafter referred to as the "Principal" and _____, a corporation organized and existing under the laws of the State of _____, with its principal office in the City of _____ and authorized to transact business in this State and U. S. Department of the Treasury Listed (Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies); hereinafter referred to as the "Surety," are held and firmly bound unto the State of Utah, hereinafter referred to as the "Obligee, " in the amount of _____ _____ DOLLARS ($_____) for the payment whereof, the said Principal and Surety bind themselves and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written Contract with the Obligee, dated the _____ day of _____, 20____, to construct _____ in the County of _____, State of Utah, Project No. _____, for the approximate sum of _____ _____ Dollars ($_____), which Contract is hereby incorporated by reference herein.

NOW, THEREFORE, the condition of this obligation is such that if the said Principal shall faithfully perform the Contract in accordance with the Contract Documents including, but not limited to, the Plans, Specifications and conditions thereof, the one year performance warranty, and the terms of the Contract as said Contract may be subject to Modifications or changes, then this obligation shall be void; otherwise it shall remain in full force and effect.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the state named herein or the heirs, executors, administrators or successors of the Owner.

The parties agree that the dispute provisions provided in the Contract Documents apply and shall constitute the sole dispute procedures of the parties.

PROVIDED, HOWEVER, that this Bond is executed pursuant to the Provisions of Title 63, Chapter 56, Utah Code Annotated, 1953, as amended, and all liabilities on this Bond shall be determined in accordance with said provisions to the same extent as if it were copied at length herein.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument this _____ day of _____, 20_____.

WITNESS OR ATTESTATION:

_____

PRINCIPAL:

_____

By: _____ (Seal)

Title: _____

WITNESS OR ATTESTATION:

_____

SURETY:

_____

By: _____

Attorney-in-Fact (Seal)

STATE OF _____)
) ss.
COUNTY OF _____)

On this _____ day of _____, 20___, personally appeared before me _____, whose identity is personally known to me or proved to me on the basis of satisfactory evidence, and who, being by me duly sworn, did say that he/she is the Attorney in-fact of the above-named Surety Company and that he/she is duly authorized to execute the same and has complied in all respects with the laws of Utah in reference to becoming sole surety upon bonds, undertakings and obligations, and that he/she acknowledged to me that as Attorney-in-fact executed the same.

Subscribed and sworn to before me this _____ day of _____, 20_____.

My commission expires: _____

Resides at: _____

_____

NOTARY PUBLIC

Agency: _____
Agent: _____
Address: _____
Phone: _____

Approved As To Form: May 25, 2005
By Alan S. Bachman, Asst Attorney General

PAYMENT BOND

(Title 63, Chapter 56, U. C. A. l953, as Amended)

KNOW ALL PERSONS BY THESE PRESENTS:

That _____ hereinafter referred to as the "Principal," and _____ _____, a corporation organized and existing under the laws of the State of _____authorized to do business in this State and U. S. Department of the Treasury Listed (Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies); with its principal office in the City of _____, hereinafter referred to as the "Surety," are held and firmly bound unto the State of Utah hereinafter referred to as the "Obligee," in the amount of _____ Dollars ($_____) for the payment whereof, the said Principal and Surety bind themselves and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written Contract with the Obligee, dated the _____ day of _____, 20____, to construct _____ in the County of _____, State of Utah, Project No. _____ for the approximate sum of _____ _____ Dollars ($_____), which contract is hereby incorporated by reference herein.

NOW, THEREFORE, the condition of this obligation is such that if the said Principal shall pay all claimants supplying labor or materials to Principal or Principal's Subcontractors in compliance with the provisions of Title 63, Chapter 56, of Utah Code Annotated, l953, as amended, and in the prosecution of the Work provided for in said Contract, then, this obligation shall be void; otherwise it shall remain in full force and effect.

That said Surety to this Bond, for value received, hereby stipulates and agrees that no changes, extensions of time, alterations or additions to the terms of the Contract or to the Work to be performed thereunder, or the specifications or drawings accompanying same shall in any way affect its obligation on this Bond, and does hereby waive notice of any such changes, extensions of time, alterations or additions to the terms of the Contract or to the Work or to the specifications or drawings and agrees that they shall become part of the Contract Documents.

PROVIDED, HOWEVER, that this Bond is executed pursuant to the provisions of Title 63, Chapter 56, Utah Code Annotated, 1953, as amended, and all liabilities on this Bond shall be determined in accordance with said provisions to the same extent as if it were copied at length herein.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument this _____ day of _____, 20____.

WITNESS OR ATTESTATION:

_____

PRINCIPAL:

_____

By: _____ (Seal)

Title: _____

WITNESS OR ATTESTATION:

_____

SURETY:

_____

By: _____

Attorney-in-Fact (Seal)

STATE OF _____)
) ss.
COUNTY OF _____)

On this _____ day of _____, 20_____, personally appeared before me _____ _____, whose identity is personally known to me or proved to me on the basis of satisfactory evidence, and who, being by me duly sworn, did say that he/she is the Attorney-in-fact of the above-named Surety Company, and that he/she is duly authorized to execute the same and has complied in all respects with the laws of Utah in reference to becoming sole surety upon bonds, undertakings and obligations, and that he/she acknowledged to me that as Attorney-in-fact executed the same.

Subscribed and sworn to before me this _____ day of _____, 20_____.

My commission expires: _____

Resides at: _____

_____

NOTARY PUBLIC

Agency: _____
Agent: _____
Address: _____
Phone: _____

Approved As To Form: May 25, 2005
By Alan S. Bachman, Asst Attorney General

STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

Division of Facilities Construction and Management

DFCM

CERTIFICATE OF SUBSTANTIAL COMPLETION

PROJECT _____ PROJECT NO: _____

AGENCY/INSTITUTION _____

AREA ACCEPTED _____

The Work performed under the subject Contract has been reviewed on this date and found to be Substantially Completed as defined in the General Conditions; including that the construction is sufficiently completed in accordance with the Contract Documents, as modified by any change orders agreed to by the parties, so that the State of Utah can occupy the Project or specified area of the Project for the use for which it is intended.

The DFCM - (Owner) accepts the Project or specified area of the Project as Substantially Complete and will assume full possession of the Project or specified area of the Project at _____ (time) on _____ (date).

The DFCM accepts the Project for occupancy and agrees to assume full responsibility for maintenance and operation, including utilities and insurance, of the Project subject to the itemized responsibilities and/or exceptions noted below:

_____

_____

The Owner acknowledges receipt of the following closeout and transition materials:

As-built Drawings | O & M Manuals | Warranty Documents | Completion of Training Requirements

A list of items to be completed or corrected (Punch List) is attached hereto. The failure to include an item on it does not alter the responsibility of the Contractor to complete all the Work in accordance with the Contract Documents, including authorized changes thereof. The amount of _____(Twice the value of the punch list work) shall be retained to assure the completion of the punch list work.

The Contractor shall complete or correct the Work on the list of (Punch List) items appended hereto within _____ ____calendar days from the above date of issuance of this Certificate. The amount withheld pending completion of the list of items noted and agreed to shall be: $_____. If the list of items is not completed within the time allotted the Owner has the right to be compensated for the delays and/or complete the work with the help of independent contractor at the expense of the retained project funds. If the retained project funds are insufficient to cover the delay/completion damages, the Owner shall be promptly reimbursed for the balance of the funds needed to compensate the Owner.

_____ by: _____

CONTRACTOR (include name of firm) (Signature) DATE

_____ by: _____

A/E (include name of firm) (Signature) DATE

_____ by: _____

USING INSTITUTION OR AGENCY (Signature) DATE

_____ by: _____

DFCM (Owner) (Signature) DATE

4110 State Office Building, Salt Lake City, Utah 84114 cc: Parties Noted
telephone 801-538-3018 • facsimile 801-538-3267 • http://dfcm.utah.gov DFCM, Director

STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

Division of Facilities Construction and Management

DFCM

General Contractor Performance Rating Form

Project Name:		DFCM Project#	
Contractor: (ABC Construction, John Doe, 111-111-1111)	A/E: (ABC Architects, Jane Doe, 222-222-2222)	Original Contract Amount:	Final Contract Amount:
DFCM Project Manager:		Contract Date:	
Completion Date:		Date of Rating:	

Rating Guideline	QUALITY OF PRODUCT OR SERVICES	COST CONTROL	TIMELINESS OF PERFORMANCE	BUSINESS RELATIONS
5-Exceptional	Contractor has demonstrated an exceptional performance level in any of the above four categories that justifies adding a point to the score. Contractor performance clearly exceeds the performance levels described as "Very Good"			
4-Very Good	Contractor is in compliance with contract requirements and/or delivers quality product/service.	Contractor is effective in managing costs and submits current, accurate, and complete billings	Contractor is effective in meeting milestones and delivery schedule	Response to inquiries, technical/service/ administrative issues is effective
3-Satisfactory	Minor inefficiencies/errors have been identified	Contractor is usually effective in managing cost	Contractor is usually effective in meeting milestones and delivery schedules	Response to inquires technical/ service/administrative issues is somewhat effective
2-Marginal	Major problems have been encountered	Contractor is having major difficulty managing cost effectively	Contractor is having major difficulty meeting milestones and delivery schedule	Response to inquiries, technical/service/administrative issues is marginally effective
1-Unsatisfactory	Contractor is not in compliance and is jeopardizing achievement of contract objectives	Contractor is unable to manage costs effectively	Contractor delays are jeopardizing performance of contract objectives	Response to inquiries, technical/service/administrative issues is not effective

1. Rate Contractors quality of workmanship, management of sub contractor performance, project cleanliness, organization and safety requirement.	**Score**
Agency Comments:	
A & E Comments:	
DFCM Project Manager Comments:	

2. Rate Contractor administration of project costs, change orders and financial management of the project budget.	Score
Agency Comments:	
A & E Comments:	
DFCM Project Manager Comments:	

3. Rate Contractor's performance and adherence to Project Schedule, delay procedures and requirements of substantial completion, inspection and punch-list performance.	Score
Agency Comments:	
A & E Comments:	
DFCM Project Manager Comments:	

4. Evaluate performance of contractor management team including project manager, engineer and superintendent also include in the rating team's ability to work well with owner, user agency and consultants.	Score
Agency Comments:	
A & E Comments:	
DFCM Project Manager Comments:	

5. Rate success of Contractor's management plan, completion of the plans mitigation of project risks and performance of value engineering concepts.	Score
Agency Comments:	
A & E Comments:	
DFCM Project Manager Comments:	

Signed by:	Date:	Mean Score

Additional Comments:

Technical Specification For

Dead Horse Point State Park, Moab,Utah
New Restroom Facilities

09 November 2007

P+A Architects
821 Kensington Avenue
Salt Lake City, Utah 84105

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SECTION 01010 - SUMMARY OF WORK

1.1 GENERAL

A. The Project consists of constructing two new restroom facilities for the Dead Horse Point State Park in Moab, Utah. The construction will consists of concrete slab on grade, wood framing, gypsum wall board, membrane roofing system, cement plaster system, hollow metal doors, ceramic tile, plumbing systems, electrical systems and mechanical systems as described on construction documents and specifications. The project has two additive alternates as described in specification section 01030.

1. Project Location: State Road 313, P.O. Box 609, Moab, Utah 84532
2. Owner: Division of Parks and Recreation

B. Contract Documents, dated November 9th 2007, were prepared for the project by P+A architects. located at 821 East Kensington Avenue, Salt Lake City, Utah

C. The Work will be constructed under a single prime contract.

D. Use of the Site: Limit use of premises to areas indicated on construction documents. Do not disturb portions of the site beyond the areas indicated.

1. Allow for Owner occupancy and use by the public.
2. Keep driveways and entrances clear. Do not use these areas for parking or material storage. Schedule deliveries to minimize on-site storage of materials and equipment.

1.2 CONTRACTOR USE OF PREMISES

A. General: During the construction period, the Contractor shall have use of the premises for construction operations as shown on construction documents. Parking and contractor staging at the site is limited and will be reviewed at the pre bid conference.

B. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.

1. Driveways and Entrances: Keep driveways and entrances serving the premises clear and available to other occupants and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

END OF SECTION 01010

SECTION 01027 - APPLICATIONS FOR PAYMENT

1.1 GENERAL

A. Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule, Submittal Schedule, and List of Subcontracts.

B. Schedule of Values: Coordinate preparation of the Schedule of Values with preparation of the Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:

   a. Contractor's Construction Schedule.
   b. Application for Payment forms, including Continuation Sheets.
   c. List of subcontractors.
   d. List of products.
   e. List of principal suppliers and fabricators.
   f. Schedule of submittals.

2. Submit the Schedule of Values at the earliest possible date but no later than 7 days before the date scheduled for submittal of the initial Applications for Payment.

C. Format and Content: Use the Project Manual table of contents as a guide to establish the format for the Schedule of Values. Provide at least one line item for each Specification Section.

1. Include the following Project identification:

   a. Project name and location.
   b. Name of Architect.
   c. Project number.
   d. Contractor's name and address.
   e. Date of submittal.

2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:

   a. Related Specification Section or Division.
   b. Description of Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Dollar value.
   h. Percentage of Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

3. Provide a breakdown of the Contract Sum in sufficient detail to facilitate evaluation of Applications for Payment. Break subcontract amounts down into several line items. Round amounts to nearest whole dollar; the total shall equal the Contract Sum.
4. Provide a separate line item for each part of the Work where Applications for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed.

5. Provide separate line items for initial cost of the materials, for each subsequent stage of completion, and for total installed value.
6. Show line items for indirect costs and margins on costs only when such items are listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete. Include the total cost and proportionate share of general overhead and profit margin for each item.

    a. Temporary facilities and items that are not direct cost of work-in-place may be shown as separate line items or distributed as general overhead expense.

7. Update and resubmit the Schedule of Values when Change Orders or Construction Change Directives change the Contract Sum.

D. Applications for Payment shall be consistent with previous applications and payments as certified by the Owner and paid for by the Owner.

E. Payment-Application Times: Payment dates are indicated in the Agreement. The period covered by each application is the period indicated in the Agreement.

F. Payment-Application Forms: Use AIA Document G702 and Continuation Sheets G703 as the form for Applications for Payment.

G. Application Preparation: Complete every entry, including notarization and execution by a person authorized to sign on behalf of the Contractor. The owner will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and the Contractor's Construction Schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.

H. Transmittal: Submit 3 executed original copies of each Application for Payment to the ownerwithin 24 hours. One copy shall be complete, including waivers of lien and similar attachments.

1. Transmit each copy with a transmittal listing attachments and recording appropriate information related to the application.

I. Waivers of Mechanics Lien: With each Application for Payment, submit waivers of lien from every entity who may file a lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.
2. When an application shows completion of an item, submit final or full waivers.
3. Submit each Application for Payment with Contractor's waiver of lien for the period of construction covered by the application.

    a. Submit final Applications for Payment with final waivers from every entity involved with performance of the Work covered by the application who may file a lien.

4. Waiver Forms: Submit waivers of lien on forms, and executed in a manner, acceptable to the Owner.

J. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:

1. List of subcontractors.
2. List of principal suppliers and fabricators.
3. Schedule of Values.
4. Contractor's Construction Schedule (preliminary if not final).
5. Submittal Schedule (preliminary if not final).
6. List of Contractor's staff assignments.
7. Copies of building permits.
8. Copies of licenses from governing authorities.
9. Certificates of insurance and insurance policies.
10. Performance and payment bonds.

K. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

1. Administrative actions and submittals that shall precede or coincide with this application include the following:

   a. Occupancy permits.
   b. Warranties and maintenance agreements.
   c. Maintenance instructions.
   d. Meter readings.
   e. Changeover information related to Owner's occupancy.
   f. Final cleaning.
   g. Application for reduction of retainage and consent of surety.

L. Final Payment Application: Administrative actions and submittals that must precede or coincide with submittal of the final Application for Payment include the following:

1. Completion of Project closeout requirements.
2. Completion of items specified for completion after Substantial Completion.
3. Transmittal of Project construction records to the Owner.
4. Removal of temporary facilities and services.
5. Change of door locks to Owner's access.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION (Not Applicable)

END OF SECTION 01027

SECTION 01030 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements governing Alternates.

1.3 DEFINITIONS

A. Definition: An alternate is an amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate the Alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Modify or adjust affected adjacent Work as necessary to completely and fully integrate that Work into the Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.

B. Notification: Immediately following the award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate whether alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

C. Execute accepted alternates under the same conditions as other Work of this Contract.

D. Schedule: A "Schedule of Alternates" is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials necessary to achieve the Work described under each alternate.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Additive alternate number one is for the general contractor to provide xxxx cubic yards of additional structural fill for the point restroom and xxxx cubic yards of additional structural fill for the camp ground restroom as needed to raise the floor slab level to the elevation as shown on the site plan drawings. The point restroom would also need a new concrete stair with painted pipe hand railing as shown on site plan drawing A-SP101 and as details on drawing A-AA700.

B. Alternate No. 2: Additive alternate number two is for the general contractor to provide stone veneer for the wing walls at the entrances to each restroom and at the dumpster enclosure located at the campground restroom. The stone that is to be used will be provided by State Parks, see wall section 03/AAA700

END OF SECTION 01030

SECTION 01040 - COORDINATION

1.1 GENERAL

A. This Section includes requirements for coordinating construction operations including, but not necessarily limited to, the following:

1. Coordination drawings.
2. Administrative and supervisory personnel.
3. Cleaning and protection.

1.2 COORDINATION

A. Coordinate construction to assure efficient and orderly installation of each part of the Work. Coordinate operations that depend on each other for proper installation, connection, and operation.

1. Schedule operations in the sequence required to obtain the best results where installation of one part depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to assure maximum accessibility for maintenance, service, and repair.
3. Make provisions to accommodate items scheduled for later installation.

B. Where necessary, prepare memoranda for distribution to each party involved, outlining procedures required for coordination. Include such items as required notices and reports.

1. Prepare similar memoranda for the Owner and separate contractors where coordination of their work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required procedures with other activities to avoid conflicts and assure orderly progress. Such activities include, but are not limited to, the following:

1. Preparation of schedules.
2. Delivery and processing of submittals.
3. Progress meetings.
4. Project closeout activities.

D. Conservation: Coordinate construction to assure that operations are carried out with consideration for conservation of energy, water, and materials.

E. Staff Names: Within 15 days of commencement of construction, submit a list of the Contractor's staff assignments, including the superintendent and other subcontractors at the Project. Identify individuals and their responsibilities. List their addresses and telephone numbers.

1.3 PRODUCTS (Not Applicable)

1.4 EXECUTION

A. Inspection of Conditions: Require Installers of major components to inspect substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected.

B. Clean and protect construction in progress and adjoining materials, during handling and installation. Apply protective covering to assure protection from damage.

C. Clean and maintain completed construction as necessary through the construction period. Adjust and lubricate operable components to assure operability without damaging effects.

D. Limiting Exposures: Supervise construction to assure that no part is subject to harmful, dangerous, or damaging exposure. Such exposures include, but are not limited to, the following:

1. Excessive static or dynamic loading.
2. Excessive internal or external pressures.
3. Excessively high or low temperatures.
4. Water or ice.
5. Solvents and chemicals.
6. Abrasion.
7. Soiling, staining, and corrosion.
8. Combustion.
9. Wind.

END OF SECTION 01040

SECTION 01400 - QUALITY CONTROL

1.1 GENERAL

A. Quality-control services include inspections, tests, and related actions, including reports performed by Contractor, by independent agencies, and by governing authorities.

B. Contractor Responsibilities: Unless they are the responsibility of another entity, Contractor shall provide inspections and tests specified elsewhere and required by authorities having jurisdiction. Costs for these services are included in the Contract Sum.

1. Where inspections and tests are the Contractor's responsibility, the Contractor shall employ and pay a qualified independent testing agency to perform these services. Costs for these services are included in the Contract Sum.

C. Retesting: The Contractor is responsible for retesting where results of inspections and tests prove unsatisfactory and indicate noncompliance with requirements.

1. The cost of retesting is the Contractor's responsibility where tests performed indicated noncompliance with requirements.

D. Auxiliary Services: Cooperate with agencies performing inspections and tests. Provide auxiliary services as requested. Notify the agency in advance of operations to permit assignment of personnel. Auxiliary services include the following:

1. Providing access to the Work.
2. Furnishing incidental labor and facilities to assist inspections and tests.
3. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.
4. Providing facilities for storage and curing of test samples.
5. Delivering samples to testing laboratories.
6. Providing preliminary design mix proposed for use for materials mixes that require control by the testing agency.
7. Providing security and protection of samples and test equipment.

E. Duties of the Testing Agency: The testing agency shall cooperate with the owner and the Contractor in performing its duties. The agency shall provide qualified personnel to perform inspections and tests.

1. The agency shall notify the owner and the Contractor of irregularities or deficiencies observed in the Work during performance of its services.
2. The agency shall not release, revoke, alter, or enlarge requirements or approve or accept any portion of the Work.
3. The agency shall not perform duties of the Contractor.

F. Coordination: Coordinate activities to accommodate services with a minimum of delay. Avoid removing and replacing construction to accommodate inspections and tests.

1. The Contractor is responsible for scheduling inspections, tests, taking samples, and similar activities.

G. Submittals: The testing agency shall submit a certified written report, in duplicate, of each inspection and test to the Owner. If the Contractor is responsible for the service, submit a certified written report, in duplicate, of each inspection or test through the Contractor.

1. Submit additional copies of each report to the governing authority, when the authority so directs.
2. Report Data: Reports of each inspection, test, or similar service include, but are not limited to, the following:

a. Date of issue.
b. Project title and number.
c. Name, address, and telephone number of testing agency.
d. Dates and locations of samples and tests or inspections.
e. Names of individuals making the inspection or test.
f. Designation of the Work and test method.
g. Identification of product and Specification Section.
h. Complete inspection or test data.
i. Test results and an interpretation of test results.
j. Ambient conditions at the time of sample taking and testing.
k. Comments or professional opinion on whether inspected or tested Work complies with requirements.
l. Name and signature of laboratory inspector.
m. Recommendations on retesting.

H. Qualifications for Service Agencies: Engage inspection and testing service agencies that are prequalified as complying with the American Council of Independent Laboratories' "Recommended Requirements for Independent Laboratory Qualification" and that specialize in the types of inspections and tests to be performed.

1. Each agency shall be authorized by authorities having jurisdiction to operate in the state where the Project is located.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION

A. Repair and Protection: Upon completion of inspection, testing, and sample taking, repair damaged construction. Restore substrates and finishes. Comply with Division 1 Section "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities, and protect repaired construction.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for inspection and testing.

END OF SECTION 01400

SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes requirements for construction facilities and temporary controls, including temporary utilities, support facilities, and security and protection.

B. Temporary utilities include, but are not limited to, the following:

1. Water service and distribution.
2. Temporary electric power and light.
3. Temporary heat.
4. Ventilation.
5. Sanitary facilities, including drinking water.
6. Storm and sanitary sewer.

C. Support facilities include, but are not limited to, the following:

1. Storage sheds.
2. Dewatering facilities and drains.
3. Temporary project identification signs and bulletin boards.
4. Waste disposal services.

D. Security and protection facilities include, but are not limited to, the following:

1. Temporary fire protection.
2. Barricades, warning signs, and lights.
3. Sidewalk bridge or enclosure fence for the site.

1.3 SUBMITTALS

A. Temporary Utilities: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.

1.4 QUALITY ASSURANCE

A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:

1. Building code requirements.
2. Health and safety regulations.

3. Utility company regulations.
4. Police, fire department, and rescue squad rules.
5. Environmental protection regulations.

B. Standards: Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."

1. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code."

C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

A. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of permanent service.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Tarpaulins: Provide waterproof, fire-resistant, UL-labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.

B. Water: Provide potable water approved by local health authorities.

C. Open-Mesh Fencing: Provide 0.120-inch- (3-mm-) thick, galvanized 2-inch (50-mm) chainlink fabric fencing 6 feet (2 m) high with galvanized barbed-wire top strand and galvanized steel pipe posts, 1-1/2 inches (38 mm) I.D. for line posts and 2-1/2 inches (64 mm) I.D. for corner posts.

2.2 EQUIPMENT

A. General: Provide new equipment. If acceptable to the Architect, the Contractor may use undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.

B. Water Hoses: Provide 3/4-inch, heavy-duty, abrasion-resistant, flexible rubber hoses 100 feet long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.

C. Electrical Outlets: Provide properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-Volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.

D. Electrical Power Cords: Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.

E. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixtures where exposed to moisture.

F. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.

G. Temporary Toilet Units: Provide self-contained, single-occupant toilet units of the chemical, aerated recirculation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.

H. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures.

1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.

1. Arrange with company and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.
2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
3. Obtain easements to bring temporary utilities to the site where the Owner's easements cannot be used for that purpose.
4. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Architect. Neither the Owner nor Architect will accept cost or use charges as a basis of claims for Change Orders.

B. Water Service: Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use.

1. Sterilization: Sterilize temporary water piping prior to use.

C. Temporary Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnects, automatic ground-fault interrupters, and main distribution switch gear.

1. Install electric power service underground, except where overhead service must be used.
2. Power Distribution System: Install wiring overhead and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Volts, ac 20 Ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.

D. Temporary Lighting: When overhead floor or roof deck has been installed, provide temporary lighting with local switching.

1. Install and operate temporary lighting that will fulfill security and protection requirements without operating the entire system. Provide temporary lighting that will provide adequate illumination for construction operations and traffic conditions.

E. Temporary Heat: Provide temporary heat required by construction activities for curing or drying of completed installations or for protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

F. Heating Facilities: Except where the Owner authorizes use of the permanent system, provide vented, self-contained, LP-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open flame, or salamander heating units is prohibited.

G. Sanitary facilities include temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.

1. Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste containers for used material.

H. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.

I. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a healthy and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.

J. Drinking-Water Facilities: Provide containerized, tap-dispenser, bottled-water drinking-water units, including paper supply.

K. Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.

3.3 SUPPORT FACILITIES INSTALLATION

A. Locate field offices, storage sheds, and other temporary construction and support facilities for easy access. Field offices are not required unless the general contractor wishes to provide one.

1. Maintain support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.

B. Storage and Fabrication Sheds: Install storage and fabrication sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on-site.

C. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.

D. Temporary Lifts and Hoists: Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

E. Temporary Exterior Lighting: Install exterior yard and sign lights so signs are visible when Work is being performed.

F. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F (27 deg C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer, as requested by the Architect.

B. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations."

1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
2. Store combustible materials in containers in fire-safe locations.
3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for fighting fires. Prohibit smoking in hazardous fire-exposure areas.
4. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

C. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.

D. Enclosure Fence: Before mobilization begins, install a tortoise barrier fence with barrier gates. Locate where indicated. Enclose the entire site as shown on drawings. Install in a manner that will prevent tortoise and other animals from easily entering the site.

1. See architectural site plan

E. If the general contractor wishes to provide a security enclosure they may do so. Security of the site and construction materials, equipment and all items on site is the responsibility of the general contractor.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
2. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

C. Termination and Removal: Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended, when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are the Contractor's property.
   a. At Substantial Completion, clean permanent facilities.

END OF SECTION 01500

SECTION 01700 - CONTRACT CLOSEOUT

1.1 GENERAL

A. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 16.

B. Substantial Completion: Before requesting inspection for certification of Substantial Completion, complete the following:

1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the Work claimed as substantially complete.

   a. Include supporting documentation for completion and an accounting of changes to the Contract Sum.

2. Advise the Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
4. Submit record drawings, maintenance manuals, final project photographs, damage or settlement surveys, property surveys, and similar final record information.
5. Deliver tools, spare parts, extra stock, and similar items.
6. Changeover locks and transmit keys to the Owner.
7. Complete startup testing of systems and instruction of operation and maintenance personnel.
8. Complete final cleanup requirements, including touchup painting.
9. Touch up and repair and restore marred, exposed finishes.

C. Inspection Procedures: On receipt of a request for inspection, the Project Manager will proceed or advise the Contractor of unfilled requirements. The Project Manager will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Project Manager will repeat inspection when requested and assured that the Work is substantially complete.
2. Results of the completed inspection will form the basis of requirements for final acceptance.

D. Final Acceptance: Before requesting inspection for certification of final acceptance and final payment, complete the following:

1. Final payment request with releases and supporting documentation. Include insurance certificates where required.
2. Submit a statement, accounting for changes to the Contract Sum.
3. Submit a copy of the final inspection list stating that each item has been completed or otherwise resolved for acceptance.
4. Submit consent of surety to final payment.
5. Submit a final settlement statement.
6. Submit evidence of continuing insurance coverage complying with insurance requirements.

E. Reinspection Procedure: The owner will reinspect the Work upon receipt of notice that the Work has been completed, except for items whose completion is delayed under circumstances acceptable to the owner.

1. Upon completion of reinspection, the owner will prepare a certificate of final acceptance. If the Work is incomplete, the owner will advise the Contractor of Work that is incomplete or obligations that have not been fulfilled but are required.
2. If necessary, reinspection will be repeated.

F. Record Document Submittals: Do not use record documents for construction. Protect from loss in a secure location. Provide access to record documents for the owners's reference.

G. Record Drawings: Maintain a set of prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark the drawing most capable of showing conditions fully and accurately. Give attention to concealed elements.

1. Mark sets with red pencil. Use other colors to distinguish between variations in separate categories of the Work.
2. Organize record drawing sheets into manageable sets. Bind with durable-paper cover sheets; print titles, dates, and other identification on the cover of each set.

H. Record Specifications: Maintain one copy of the Project Manual, including addenda. Mark to show variations in Work performed in comparison with the text of the Specifications and modifications. Give attention to substitutions and selection of options and information on concealed construction. Note related record drawing information and Product Data.

1. Upon completion of the Work, submit record Specifications to the owner for their records.

I. Maintenance Manuals: Organize operation and maintenance data into sets of manageable size. Bind in individual, heavy-duty, 2-inch (51-mm), 3-ring, binders, with pocket folders for folded sheet information. Mark identification on front and spine of each binder. Include the following information:

1. Copies of warranties.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION

A. Operation and Maintenance Instructions: Include a detailed review of the following items:

1. Maintenance manuals.

B. As part of instruction for operating equipment, demonstrate the following:

1. Startup and shutdown.
2. Noise and vibration adjustments.

C. Final Cleaning: Employ experienced cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Complete the following operations before requesting inspection for certification of Substantial Completion.

1. Remove labels that are not permanent labels.
2. Clean exposed finishes to a dust-free condition, free of stains, films, and foreign substances. Leave concrete floors broom clean.

3. Wipe surfaces of electrical equipment. Remove excess lubrication. Clean light fixtures and lamps.
4. Clean the site of rubbish, litter, and foreign substances. Sweep paved areas; remove stains, spills, and foreign deposits. Rake grounds to a smooth, even-textured surface.

D. Removal of Protection: Remove temporary protection and facilities.

E. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Remove waste materials and dispose of lawfully.

END OF SECTION 01700

SECTION 01740 - WARRANTIES

1.1 GENERAL

A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

C. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

D. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.

E. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

F. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

G. Owner's Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.

   1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
   2. Where the Contract Documents require a special warranty, or similar commitment, the Owner reserves the right to refuse to accept the Work, until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.

H. Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Owner's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion, submit written warranties upon request of the Owner's.

I. When the Contract Documents require the Contractor, or the Contractor and a subcontractor, supplier or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner for approval prior to final execution.

   1. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

J. Bind warranties and bonds in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (115-by-280-mm) paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the Installer.
2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title or name, and name of the Contractor.
3. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION

A. Schedule: Provide warranties on products and installations as specified in the following Sections:

END OF SECTION 01740

SECTION 02230 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Removing trees and other vegetation.
2. Clearing and grubbing.
3. Topsoil stripping.
4. Removing above-grade site improvements.

B. Related Sections include the following:

1. Division 1 Section "Construction Facilities and Temporary Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities, and environmental protection measures during site operations.
2. Division 2 Section "Earthwork" for soil materials, excavating, backfilling, and site grading.

1.3 DEFINITIONS

A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of weeds, roots, and other deleterious materials.

1.4 MATERIALS OWNERSHIP

A. Except for materials indicated to be stockpiled or to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from the site.

1.5 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.

B. Notify utility locator service for area where Project is located before site clearing.

PART 2 - PRODUCTS (Not Applicable)

2.1 SOIL MATERIALS

A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 2 Section "Earthwork."

1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 UTILITIES

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Project Manager not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Project Manager's written permission.

3.3 CLEARING AND GRUBBING

A. Remove obstructions, sage brush, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots.
1. Completely remove stumps, roots, obstructions, and debris extending to a depth of 18" below exposed subgrade

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding 6-inch (200-mm) loose depth, and compact each layer to a density equal to adjacent original ground.

3.4 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Strip surface soil of unsuitable topsoil, including trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Limit height of topsoil stockpiles to 72 inches (1800 mm).
2. Do not stockpile topsoil within drip line of remaining trees.
3. Dispose of excess topsoil as specified for waste material disposal.
4. Stockpile surplus topsoil and allow for respreading deeper topsoil.

3.5 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

B. Remove paving as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing asphalt pavement to remain before removing existing pavement. Saw-cut faces vertically.

3.6 DISPOSAL

A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 02230

SECTION 02300 - EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Preparing subgrades for slabs-on-grade, walks, pavements.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for slabs-on-grade.
4. Subbase course for concrete walks and pavements.
5. Subsurface drainage backfill for walls and trenches.
6. Excavating and backfilling trenches within building lines.

B. Related Sections include the following:

1. Division 2 Section "Site Clearing" for site stripping, grubbing, removing topsoil, and protecting trees to remain.

1.3 DEFINITIONS

A. Backfill: Soil materials used to fill an excavation.

B. Base Course: Layer placed between the subbase course and asphalt paving.

C. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.

D. Drainage Course: Layer supporting slab-on-grade used to minimize capillary flow of pore water.

E. Excavation: Removal of material encountered above subgrade elevations.

1. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

F. Fill: Soil materials used to raise existing grades

G. Structures: Buildings, footings, foundations, slabs, or other man-made stationary features constructed above or below the ground surface.

H. Subbase Course: Layer placed between the subgrade and base course for asphalt paving, or layer placed between the subgrade and a concrete pavement or walk.

I. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

1.4 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.
3. Contact utility-locator service for area where Project is located before excavating.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Backfill and Fill: Satisfactory soil materials.

C. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility; colored as follows:

B. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

C. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavation to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

3.6 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit, unless otherwise indicated.

1. Clearance: 12 inches (300 mm) on each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. For pipes and conduit less than 6 inches (150 mm) in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.

D. Trench Bottoms: Excavate trenches 4 inches (100 mm) deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.

3.7 APPROVAL OF SUBGRADE

A. If Project Manager determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

1. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

B. Proof roll subgrade with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrades.

C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Project Manager.

3.8 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by Project Manager.

1. Fill unauthorized excavations under other construction or utility pipe as directed by Project Manager.

3.9 STORAGE OF SOIL MATERIALS

A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations.

3.10 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Surveying locations of underground utilities for record documents.
2. Inspecting and testing underground utilities.
3. Removing trash and debris.
4. Removing temporary shoring and bracing, and sheeting.
5. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

3.11 FILL

A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.

B. Place and compact fill material in layers to required elevations as follows:

1. Under building slabs, use engineered fill.
2. Under footings and foundations, use engineered fill.

3.12 UTILITY TRENCH BACKFILL

A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

B. Backfill trenches excavated under footings and within 18 inches (450 mm) of bottom of footings; fill with concrete to elevation of bottom of footings.

C. Place and compact initial backfill of subbase material, free of particles larger than 1 inch (25 mm), to a height of 12 inches (300 mm) over the utility pipe or conduit.

1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.

D. Coordinate backfilling with utilities testing.

E. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.

F. Place and compact final backfill of satisfactory soil material to final subgrade.
Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.13 MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.14 COMPACTION OF BACKFILLS AND FILLS

A. Place backfill and fill materials in layers not more than 6 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:

D. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 698:

1. Under structures, building slabs and pavements, scarify and recompact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill material at 95 percent.

3.15 GRADING

A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge

3.16 SUBBASE AND BASE COURSES

A. Under pavements and walks, place subbase course on prepared subgrade and as follows:

1. Place base course material over subbase.
2. Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
3. Shape subbase and base to required crown elevations and cross-slope grades.

4. When thickness of compacted subbase or base course is 6 inches (150 mm) or less, place materials in a single layer.
5. When thickness of compacted subbase or base course exceeds 6 inches (150 mm), place materials in equal layers, with no layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick when compacted.

B. Pavement Shoulders: Place shoulders along edges of subbase and base course to prevent lateral movement. Construct shoulders, at least 12 inches (300 mm) wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.17 DRAINAGE COURSE

A. Under slabs-on-grade, place drainage course on prepared subgrade and as follows:

1. Compact drainage course to required cross sections and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.
2. When compacted thickness of drainage course is 6 inches (150 mm) or less, place materials in a single layer.
3. When compacted thickness of drainage course exceeds 6 inches (150 mm), place materials in equal layers, with no layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick when compacted.

3.18 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Project Manager.

D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for paved area or building slab.
2. Foundation Wall Backfill: At each compacted backfill layer, at least one test.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.19 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Project Manager; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.20 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

B. Disposal: Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Project Manager.

1. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 02300

SECTION 02510 - WATER DISTRIBUTION

1.1 GENERAL

A. Comply with NSF 61 for materials for potable water.

1.2 PRODUCTS

A. Pipes and Tubes: Applications of the following pipe and tube materials are indicated in "Piping Applications" Paragraph.

1. Ductile-Iron, Push-on-Joint Pipe: AWWA C151, with cement-mortar lining and seal coat. Include rubber compression gasket.

B. Pipe and Tube Fittings: Applications of the following pipe and tube fitting materials are indicated in "Piping Applications" Paragraph.

1. Ductile-Iron, Push-on-Joint Fittings: AWWA C110, ductile-iron or cast-iron; or AWWA C153, ductile-iron, compact type. Include cement-mortar lining, seal coat, and rubber compression gaskets.

C. Joining Materials: Applications of the following piping joining materials are indicated in "Piping Applications" Paragraph. Refer to Division 2 Section "Utility Materials" for commonly used joining materials.

1. Ductile-Iron Piping: The following materials apply:

a. Push-on Joints: AWWA C111 rubber gaskets and lubricant.

2. Solder Filler Metal: ASTM B 32, Alloy Sn95, Alloy Sn94, or Alloy E, with 0.10 percent maximum lead content.
3. Pipe Couplings: Iron-body sleeve assembly, fabricated to match OD of pipes to be joined. Include sleeve, followers, gaskets, bolts and nuts, and enamel-paint finish.
4. Dielectric Fittings: Assembly or fitting with insulating material isolating joined dissimilar metals to prevent galvanic action and corrosion.

a. Dielectric Unions: Factory-fabricated union assembly, designed for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C). Include insulating material isolating dissimilar metals and ends with inside threads according to ASME B1.20.1.
b. Dielectric Flanges: Factory-fabricated companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum pressure to suit system pressures.

D. Ball Valves: AWWA C507, Class 250. Include interior coating according to AWWA C550.

E. Anchorage Materials are as follows:

1. Steel: ASTM A 506, clamps, straps, and washers; ASTM A 575, rods; and ASTM A 307, bolts.

F. Refer to Division 2 Section "Earthwork" for underground warning tape materials. Arrange for warning tapes made of solid blue film with continuously printed black-letter caption "CAUTION--WATER LINE BURIED BELOW."

1.3 EXECUTION

A. Refer to Division 2 Section "Earthwork" for excavation, trenching, and backfilling.

1. Valve Applications: locate shutoff valve in interior wall of building where water is shown to enter into building

B. Joint Construction: Refer to Division 2 Section "Utility Materials" for basic piping joint construction.

1. Ductile-Iron Piping, Gasketed Joints: According to AWWA C600.

C. Piping Systems - Common Requirements: Drawings indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings.

1. Install fittings for changes in direction and branch connections.
2. Piping Connections: Unless otherwise indicated, make piping connections as specified below:

a. Install unions, in piping 2-inch NPS (DN50) and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS (DN50) or smaller threaded pipe connection.
b. Install dielectric fittings to connect piping of dissimilar metals.

D. Extend water-service piping and connect to water-supply source and building water piping systems.

E. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

F. Anchor service-entry piping to building wall.

G. Piping Installation: Install piping according to the following:

1. Water-Main Connection: Arrange for tap in water main, of size and in location indicated on drawings.
2. Install ductile-iron piping according to AWWA C600.
3. Bury piping with depth of cover over top at least 16 inches (750 mm), with top at least 12 inches (300 mm) below level of maximum frost penetration.

H. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:

1. Gasketed-Joint, Ductile-Iron, Potable-Water Piping: According to AWWA C600.

I. Valve Installation: Use nonrising-stem UL/FM gate valves for installation with indicator posts. Use bronze corporation stops and valves, with ends compatible with piping, for 2-inch NPS (DN50) and smaller installation.

J. Install continuous plastic underground warning tape during back-filling of trench for underground water-service piping. Locate 6 to 8 inches (150 to 200 mm) below finished grade, directly over piping.

K. Conduct piping tests before joints are covered and after thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system.

L. Hydrostatic Tests: Test at 1-1/2 times working pressure for 2 hours. Maximum allowable leakage is 2 quarts (1.89 L) per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within above limits.

M. Clean and disinfect water distribution piping according to authorities having jurisdiction.

END OF SECTION 02510

SECTION 02530 - SANITARY SEWERAGE

1.1 GENERAL

A. Submit Product Data for backwater valves and cleanouts.

1.2 PRODUCTS

A. Piping Materials: Refer to "Piping Applications" Paragraph for applications.

1. Ductile-Iron Sewer Pipe: ASTM A 746, for push-on joints.

   a. Standard-Pattern, Ductile-Iron Fittings: AWWA C110, ductile or gray iron, for push-on joints.
   b. Gaskets: AWWA C111, rubber.

2. Sleeve-Type Pipe Couplings: ASTM C 1173, rubber or elastomeric sleeve and band assembly fabricated to mate with OD of pipes to be joined, for nonpressure joints.

B. Gray-Iron Backwater Valves: ASME A112.14.1, horizontal type, gray-iron body and bolted cover, with swing check valve and bronze seat.

1.3 EXECUTION

A. Excavating, trenching, and backfilling are specified in Division 2 Section "Earthwork."

B. Identification: Materials and their installation are specified in Division 2 Section "Earthwork." Arrange for installing green warning tapes directly over piping and at outside edges of underground structures.

1. Use warning tape or detectable warning tape over ferrous piping.

C. Piping Applications: Include watertight joints.
1. NPS 4 and NPS 6 (DN100 and DN150): Ductile-iron sewer pipe; standard-pattern, ductile-iron fittings; gaskets; and gasketed joints.

D. Sleeve-Type Pipe Couplings: Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.

E. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical.

F. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements. Maintain swab or drag in line, and pull past each joint as it is completed.

G. Use proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

H. Install gravity-flow piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.

1. Install piping pitched down in direction of flow, at minimum slope of 2 percent, unless otherwise indicated.

I. Extend sanitary sewerage piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.

J. Pipe Joint Construction and Installation: Join and install pipe and fittings according to installations indicated.

1. Ductile-Iron Sewer Pipe with Ductile-Iron Fittings: According to AWWA C600.

2. Join piping made of different materials or dimensions with couplings made for this application. Use couplings that are compatible with and that fit both systems' materials and dimensions.

K. Install backwater valves in piping.

L. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

M. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches (450 by 450 by 300 mm) deep. Set with tops 1 inch (25 mm) above surrounding grade.

N. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

O. Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

P. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed.

1. Place plug in end of incomplete piping at end of day and when work stops.
2. Flush piping between manholes and other structures to remove collected debris, if required by authorities having jurisdiction.

Q. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches (600 mm) of backfill is in place, and again at completion of Project.

1. Defects requiring correction include the following:

a. Alignment: Less than full diameter of inside of pipe is visible between structures.
b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
c. Crushed, broken, cracked, or otherwise damaged piping.
d. Infiltration: Water leakage into piping.
e. Exfiltration: Water leakage from or around piping.

2. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
3. Reinspect and repeat procedure until results are satisfactory.

R. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate reports for each test.
5. If authorities having jurisdiction do not have published procedures, perform tests as follows:

   a. Sanitary Sewerage: Perform hydrostatic test.

      1) Allowable leakage is maximum of 50 gal. per inch of nominal pipe size per mile (4.6 L per millimeter of nominal pipe size per kilometer) of pipe, during 24-hour period.
      2) Close openings in system and fill with water.
      3) Purge air and refill with water.
      4) Disconnect water supply.
      5) Test and inspect joints for leaks.
      6) Option: Test ductile-iron piping according to AWWA C600, Section "Hydrostatic Testing." Use test pressure of at least 10 psig (69 kPa).

   b. Sanitary Sewerage: Perform air test according to UNI-B-6.

6. Leaks and loss in test pressure constitute defects that must be repaired.
7. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION 02530

SECTION 06100 - ROUGH CARPENTRY

1.1 GENERAL

A. Submittals: Submit the following:

1. Product Data for engineered wood products, underlayment, insulating sheathing, air-infiltration barriers, metal framing anchors, and construction adhesives.
2. Research or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence code compliance of engineered wood products, foam-plastic sheathing, air-infiltration barriers, metal framing anchors, power-driven fasteners, and fire-retardant-treated wood.

1.2 PRODUCTS

A. Lumber, General: Comply with DOC PS 20 and with applicable grading rules of inspection agencies certified by the American Lumber Standards Committee's (ALSC) Board of Review. Provide dressed lumber, S4S, with each piece factory marked with grade stamp of inspection agency.

1. For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece, or omit grade stamps and provide grade-compliance certificates issued by inspection agency.
2. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal (38-mm actual) thickness or less, unless otherwise indicated.
3. Provide lumber with 15 percent maximum moisture content at time of dressing for 2-inch nominal (38-mm actual) thickness or less, unless otherwise indicated.

B. Wood-Preservative-Treated Materials: Comply with applicable requirements of AWPA C2 (lumber) and AWPA C9 (plywood). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.

1. Pressure treat aboveground items with waterborne preservatives to a minimum retention of 0.25 lb/cu. ft. (4.0 kg/cu. m). After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively. Treat indicated items and the following:

   a. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
   b. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
   c. Wood framing members less than 18 inches (460 mm) above grade.
   d. Wood floor plates installed over concrete slabs directly in contact with earth.

2. Pressure treat wood members in contact with ground or freshwater with waterborne preservatives to a minimum retention of 0.40 lb/cu. ft. (6.4 kg/cu. m).
3. Complete fabrication of treated items before treatment, where possible. If cut after treatment, apply field treatment complying with AWPA M4 to cut surfaces. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

C. Dimension Lumber: Provide dimension lumber of grades indicated according to the ALSC National Grading Rule (NGR) provisions of the inspection agency indicated.

1. Framing Other than Non-Load-Bearing Partitions: Provide Construction or No. 2 grade and any of the following species:

   a. Species: Southern pine; SPIB.
   b. Species: Douglas fir-larch; NLGA, WCLIB, or WWPA.
   c. Species: Hem-fir; NLGA, WCLIB, or WWPA.
   d. Species: Douglas fir south; WWPA.

2. Framing Other than Non-Load-Bearing Partitions: Provide any species of machine stress-rated (MSR) dimension lumber with a grade of 1450f-1.3E.

D. For timbers of 5-inch nominal (117-mm actual) size and thicker, provide Douglas fir-larch, Select Structural per NLGA, WCLIB, or WWPA rules or Southern pine, No. 1 Dense per SPIB rules.

E. Miscellaneous Lumber: Provide No. 3 or Standard grade lumber of any species for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, and similar members.

F. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that evidence compliance with building code in effect for Project. Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis, and demonstrated by comprehensive testing performed by a qualified independent testing agency.

1. Laminated-Veneer Lumber: Lumber manufactured by laminating wood veneers in a continuous press using an exterior-type adhesive complying with ASTM D 2559 to produce members with grain of veneers parallel to their lengths and complying with the following requirements:

   a. Extreme Fiber Stress in Bending: 2500 psi (17 MPa) for 12-inch nominal- (286-mm actual-) depth members.
   b. Modulus of Elasticity: 2,000,000 psi (13 800 MPa).

G. Wood-Based Structural-Use Panels: Provide either all-veneer, mat-formed, or composite panels complying with DOC PS 2, "Performance Standard for Wood-Based Structural-Use Panels," unless otherwise indicated. Provide plywood panels complying with DOC PS 1, "U.S. Product Standard for Construction and Industrial Plywood," where plywood is indicated.

1. Trademark: Factory mark structural-use panels with APA trademark evidencing compliance with grade requirements.
2. Span Ratings: Provide panels with span ratings required to suit support spacing indicated.
3. Span Ratings: Provide panels with span ratings required to meet "Code Plus" provisions of APA Form No. E30, "APA Design/Construction Guide: Residential & Commercial."
4. Wall Sheathing: APA-rated Structural I sheathing, Exposure 1.
5. Roof Sheathing: APA-rated Structural I sheathing, Exterior.

H. Air-Infiltration Barrier: Asphalt-saturated organic felt complying with ASTM D 226, Type I (No. 15 asphalt felt), unperforated.

I. Fasteners: Size and type indicated. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of Type 304 stainless steel.

1. Power-Driven Fasteners: CABO NER-272.

2. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

J. Metal Framing Anchors: Provide galvanized steel framing anchors of structural capacity, type, and size indicated and as follows:

1. Research or Evaluation Reports: Provide products for which model code research or evaluation reports exist that are acceptable to authorities having jurisdiction and that evidence compliance of metal framing anchors for application indicated with building code in effect for Project.
2. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis, and demonstrated by comprehensive testing performed by a qualified independent testing agency.
3. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653, G60 (ASTM A 653M, Z180) coating designation; structural, commercial, or lock-forming quality, as standard with manufacturer for type of anchor indicated.

K. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch (25-mm) nominal thickness, compressible to 1/32 inch (0.8 mm); selected from manufacturer's standard widths to suit width of sill members indicated.

L. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by both adhesive and panel manufacturers.

1.3 EXECUTION

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.

B. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.

C. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. CABO NER-272 for power-driven staples, P-nails, and allied fasteners.
2. Published requirements of metal framing anchor manufacturer.
3. "Recommended Nailing Schedule" of referenced framing standard and with AFPA's "National Design Specifications for Wood Construction."
4. "Table 23-I-Q--Nailing Schedule" of the Uniform Building Code.
5. "Table 2305.2--Fastening Schedule" of the BOCA National Building Code.
6. "Table 1705.1--Fastening Schedule," of the Standard Building Code.

D. Use hot-dip galvanized or stainless-steel nails where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity.

E. Countersink nail heads on exposed carpentry work and fill holes with wood filler.

F. Framing Standard: Comply with AFPA's "Manual for Wood Frame Construction," unless otherwise indicated.

G. Installation of Structural-Use Panels: Comply with applicable recommendations contained in APA Form No. E30, "APA Design/Construction Guide: Residential & Commercial," for types of structural-use panels and applications indicated.

1. Comply with "Code Plus" provisions of above-referenced guide.
2. Fastening Methods: Fasten panels as indicated below:

   a. Sheathing: Nail to framing.

H. Air-Infiltration Barrier: Cover sheathing with air-infiltration barrier to comply with manufacturer's written instructions.

   1. Apply air-infiltration barrier to cover upstanding flashing with 4-inch (100-mm) overlap.

END OF SECTION 06100

SECTION 06105 - MISCELLANEOUS CARPENTRY

1.1 GENERAL

A. Submittals: Submit wood treatment data, including chemical treatment manufacturer's instructions for handling, storing, installing, and finishing treated materials.

1.2 PRODUCTS

A. Lumber, General: Comply with DOC PS 20 and with applicable grading rules of inspection agencies certified by the American Lumber Standards Committee's (ALSC) Board of Review. Provide dressed lumber, S4S, with each piece factory marked with grade stamp of inspection agency.

1. For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece, or omit grade stamps and provide grade-compliance certificates issued by inspection agency.
2. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal (38-mm actual) thickness or less, unless otherwise indicated.
3. Provide lumber with 15 percent maximum moisture content at time of dressing for 2-inch nominal (38-mm actual) thickness or less, unless otherwise indicated.

B. Wood-Preservative-Treated Materials: Comply with applicable requirements of AWPA C2 (lumber) and AWPA C9 (plywood). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.

1. Pressure treat aboveground items with waterborne preservatives to a minimum retention of 0.25 lb/cu. ft. (4.0 kg/cu. m). After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively. Treat indicated items and the following:

   a. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
   b. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
   c. Wood framing members less than 18 inches (460 mm) above grade.
   d. Wood floor plates installed over concrete slabs directly in contact with earth.

2. Pressure treat wood members in contact with ground or freshwater with waterborne preservatives to a minimum retention of 0.40 lb/cu. ft. (6.4 kg/cu. m).

C. Fire-Retardant-Treated Materials: Comply with applicable requirements of AWPA C20 (lumber) and AWPA C27 (plywood). Identify fire-retardant-treated wood with appropriate classification marking of UL; U.S. Testing; Timber Products Inspection, Inc.; or another testing and inspecting agency acceptable to authorities having jurisdiction.

D. Dimension Lumber: Provide dimension lumber of grades indicated according to the ALSC National Grading Rule (NGR) provisions of the inspection agency indicated.

1. Interior Partitions: Provide Standard, Stud, or No. 3 grade and any of the following species:

   a. Species: Eastern softwoods; NELMA.
   b. Species: Northern species; NLGA.
   c. Species: Mixed southern pine; SPIB.

d. Species: Western woods; WCLIB or WWPA.

2. Other Framing: Provide Construction or No. 2 grade and any of the following species:

a. Species: Spruce-pine-fir; NELMA or NLGA.
b. Species: Southern pine; SPIB.
c. Species: Douglas fir-larch; NLGA, WCLIB, or WWPA.
d. Species: Hem-fir; NLGA, WCLIB, or WWPA.
e. Species: Douglas fir south; WWPA.

E. Exposed Boards: Provide lumber with 19 percent maximum moisture content and any of the following species and grades:

1. Species and Grade: Eastern white pine, D Select per NELMA or NLGA rules.
2. Species and Grade: Western or Idaho white pine, Choice per NLGA or WWPA rules.

F. Concealed Boards: Provide lumber with 19 percent maximum moisture content and any of the following species and grades:

1. Species and Grade: Eastern softwoods, No. 3 Common per NELMA rules.
2. Species and Grade: Northern species, No. 3 Common or Standard per NLGA rules.
3. Species and Grade: Mixed southern pine, No. 2 per SPIB rules.
4. Species and Grade: Western woods, Standard per WCLIB rules or No. 3 Common per WWPA rules.

G. Interior Softwood Trim: Provide finished lumber and moldings complying with the following requirements including those of the grading agency listed with species:

1. Species: Eastern white pine; NELMA or Idaho white, lodgepole, ponderosa, or sugar pine; WWPA.
2. Grade: B & Btr Select or Supreme.

H. Wood Molding Patterns: Provide stock moldings indicated, made to patterns included in WMMPA WM 7 and graded under WMMPA WM 4.

1. Moldings for Transparent Finish: N-Grade.

I. Shelving and Clothes Rods: Provide 1-inch nominal- (19-mm actual-) thickness boards of species and grade indicated above for exposed boards and 1-1/2-inch- (38-mm-) diameter clear, kiln-dried hardwood rods.

J. Wood-Based Structural-Use Panels: Provide either all-veneer, mat-formed, or composite panels complying with DOC PS 2, "Performance Standard for Wood-Based Structural-Use Panels," unless otherwise indicated. Provide plywood panels complying with DOC PS 1, "U.S. Product Standard for Construction and Industrial Plywood," where plywood is indicated.

1. Trademark: Factory mark structural-use panels with APA trademark evidencing compliance with grade requirements.
2. Miscellaneous Concealed Plywood: C-C Plugged Exterior, thickness as indicated but not less than 1/2 inch (12.7 mm).
3. Miscellaneous Exposed Plywood: A-D Interior, thickness as indicated but not less than 1/2 inch (12.7 mm).

4. Plywood Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant-treated plywood panels with grade, C-D Plugged Exposure 1, in thickness indicated or, if not otherwise indicated, not less than 15/32 inch (11.9 mm) thick.

K. Particleboard: Comply with and factory mark each panel according to ANSI A208.1. Provide thickness indicated.

1. Particleboard Underlayment: Grade PBU.

L. Hardboard Underlayment: ANSI/AHA A135.4, Class 4 (Service), Surface S1S; with back side sanded to produce boards with uniform thickness of 0.215 or 0.200 inch (5.5 or 5 mm), as standard with manufacturer, plus or minus 0.005 inch (0.13 mm).

M. Fasteners: Size and type indicated. Where miscellaneous carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of Type 304 stainless steel.

1. Power-Driven Fasteners: CABO NER-272.

1.3 EXECUTION

A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.

B. Fit carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.

C. Securely attach carpentry work as indicated and according to applicable codes and recognized standards.

D. Countersink nail heads on exposed carpentry work and fill holes with wood filler.

E. Installation of Structural-Use Panels: Comply with applicable recommendations contained in APA Form No. E30, "APA Design/Construction Guide: Residential & Commercial," for types of structural-use panels and applications indicated.

F. Install wood trim with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints.

1. Match color and grain pattern across joints.
2. Install trim after gypsum board joint finishing operations are completed.
3. Install to tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm) for plumb and level. Install adjoining trim with 1/32-inch (0.8-mm) maximum offset for flush installation and 1/16-inch (1.6-mm) maximum offset for reveal installation.

END OF SECTION 06105

SECTION 06402 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Plastic-laminate countertops.

1.3 DEFINITIONS

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items, unless concealed within other construction before woodwork installation.

1.4 SUBMITTALS

A. Product Data: For medium-density fiberboard, plywood, high-pressure decorative laminate, adhesive for bonding plastic laminate, solid-surfacing material, cabinet hardware and accessories, handrail brackets, and finishing materials and processes.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

   1. Show details full size.
   2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.

C. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of material indicated.

   1. Plastic laminates.

D. Samples for Verification: For the following:

   1. Plastic-laminate-clad panel products, 6 by 6 inches (200 by 250 mm), for each type, color, pattern, and surface finish.

E. Product Certificates: Signed by manufacturers of woodwork certifying that products furnished comply with requirements.

F. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed architectural woodwork similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Fabricator Qualifications: A firm experienced in producing architectural woodwork similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production and installation of interior architectural woodwork with sequence-matched wood veneers including wood doors where veneer matching includes door faces.

D. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork, construction, finishes, and other requirements.

1. Provide AWI certification labels or compliance certificate indicating that woodwork complies with requirements of grades specified.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and will maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 17 and 50 percent during the remainder of the construction period.

C. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.
2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements.

Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 WOODWORK FABRICATORS

A. Fabricators: Subject to compliance with requirements, provide interior architectural woodwork by a firm that has completed business activities within the local area for a period of not less than five years. Firm must have completed work to match type and scope of this project. At time of product submissions submit past work experience for consideration of Architect and Owner.

2.2 MATERIALS

A. General: Provide materials that comply with requirements of the AWI quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Wood Products: Comply with the following:

1. Hardboard: AHA A135.4.
2. Medium-Density Fiberboard: ANSI A208.2, Grade MD
3. Particleboard: ANSI A208.1, Grade M-2.
4. Softwood Plywood: DOC PS 1, Medium Density Overlay.
5. Hardwood Plywood and Face Veneers: HPVA HP-1.

C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard.

1. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following:

a. Formica Corporation.
b. Wilsonart International; Div. of Premark International, Inc.
c. Pionite

D. Adhesive for Bonding Plastic Laminate: Contact cement. Use only water based cement varieties to limit VOC,

2.3 INSTALLATION MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.4 FABRICATION, GENERAL

A. Interior Woodwork Grade: Provide Custom grade interior woodwork complying with the referenced quality standard.

B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

C. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.

2.5 PLASTIC-LAMINATE COUNTERTOPS

A. Quality Standard: Comply with AWI Section 400 requirements for high-pressure decorative laminate countertops.

B. Grade: Custom.

C. High-Pressure Decorative Laminate Grade: HGP.

a. Colors, Patterns, and Finishes: as selected from full range of colors

D. Edge Treatment: As indicated.

E. Core Material: **exterior-grade plywood.**

PART 3 - EXECUTION

3.1 PREPARATION

A. Condition woodwork to average prevailing humidity conditions in installation areas before installation.

B. Before installing architectural woodwork, examine shop-fabricated work for completion.

3.2 INSTALLATION

A. Quality Standard: Install woodwork to comply with AWI Section 1700 for the same grade specified in Part 2 of this Section for type of woodwork involved.

B. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).

C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.

D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

E. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
2. Install countertops with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
3. Calk space between backsplash and wall with sealant specified in Division 7 Section "Joint Sealants."

F. Complete the finishing work specified in this Section to extent not completed at shop or before installation of woodwork. Fill nail holes with matching filler where exposed. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats were applied in shop.

G. Refer to Division 9 Sections for final finishing of installed architectural woodwork.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

END OF SECTION 06402

SECTION 07210 - BUILDING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Foundation wall insulation (supporting backfill).
   2. Exposed building insulation.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of insulation product specified.

C. Samples of exposed insulation for initial selection in the form of actual units or sections of units showing the full range of colors available for each type of exposed insulation indicated.

D. Samples for verification in full-size units of each type of exposed insulation indicated for each color specified.

E. Product test reports from and based on tests performed by a qualified independent testing agency evidencing compliance of insulation products with specified requirements including those for thermal resistance, fire-test-response characteristics, water-vapor transmission, water absorption, and other properties, based on comprehensive testing of current products.

F. Research or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence compliance of foam-plastic insulations with building code in effect for Project.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products complying with requirements indicated without delaying the Work.

B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated on Drawings or specified elsewhere in this Section as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1. Surface-Burning Characteristics: ASTM E 84.
2. Fire-Resistance Ratings: ASTM E 119.
3. Combustion Characteristics: ASTM E 136.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect plastic insulation as follows:

1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering insulation products that may be incorporated in the work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide insulation products by one of the following:

1. Extruded-Polystyrene Board Insulation:

   a. Amoco Foam Products Company.
   b. DiversiFoam Products.
   c. Dow Chemical Co.
   d. UC Industries, Inc.; Owens-Corning Co.

2. Glass-Fiber Insulation:

   a. CertainTeed Corporation.
   b. Knauf Fiber Glass GmbH.
   c. Owens-Corning Fiberglas Corporation.
   d. Schuller International, Inc.

2.2 INSULATING MATERIALS

A. General: Provide insulating materials that comply with requirements and with referenced standards.

1. Preformed Units: Sizes to fit applications indicated; selected from manufacturer's standard thicknesses, widths, and lengths.

B. Extruded-Polystyrene Board Insulation: Rigid, cellular polystyrene thermal insulation formed from polystyrene base resin by an extrusion process using hydrochlorofluorocarbons as blowing agent to comply with ASTM C 578 for type and with other requirements indicated below:
   1. Type VII, 2.20-lb/cu. ft. (35-kg/cu. m) minimum density.
   2. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 75 and 450, respectively.
   3. Recycled Content: Not less than 50 percent blend of postconsumer and recovered polystyrene resins.

C. Unfaced Mineral-Fiber Blanket Insulation: Thermal insulation combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665, Type I (blankets without membrane facing).
   1. Mineral-Fiber Type: Fibers manufactured from glass.
   2. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.

2.3 VAPOR RETARDERS

A. Vapor-Retarder Facing: Complying with ASTM C 1136, with permeance not greater than the following when tested according to ASTM E 96, Desiccant Method:

   1. Composition: 6-mil Vinyl-faced, scrim-reinforced polyester, with permeance not greater than 0.02 perm (1.15 ng/Pa x s x sq. m).
   2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      a. CGI Silvercote, Inc.
      b. Lamtec Corporation.
      c. Mizell Bros. Co.
      d. Owens-Corning Fiberglas Corporation.

B. Retainer Strips: 0.019-inch- (0.5-mm-) thick, formed, galvanized steel or PVC retainer clips colored to match insulation facing.

2.4 AUXILIARY INSULATING MATERIALS

A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

B. Protection Board: Premolded, semirigid asphalt/fiber composition board, 1/2 inch (6 mm) thick, formed under heat and pressure, standard sizes.

2.5 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation, of thickness indicated, securely in position indicated with self-locking washer in place; and complying with the following requirements:

1. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square.
2. Spindle: Copper-coated low carbon steel, fully annealed, 0.105 inches (2.67 mm) in diameter, length to suit depth of insulation indicated.

B. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches (38 mm) square or in diameter.

1. Where spindles will be exposed to human contact after installation, protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap.

C. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of dimension indicated between face of insulation and substrate to which anchor is attached.
1. Air Space: 2 inches (50 mm).

D. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

E. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

F. Products: Subject to compliance with requirements, provide one of the following:

1. Adhesively Attached, Spindle-Type Anchors:

a. TACTOO Insul-Hangers; AGM Industries, Inc.
b. Spindle Type Gemco Hangers; Gemco.

2. Adhesively Attached, Angle-Shaped, Spindle-Type Anchor:

a. 90 Degree Insulation Hangers; Gemco.

3. Insulation-Retaining Washers:

a. RC150; AGM Industries, Inc.
b. SC150; AGM Industries, Inc.
c. Dome-Cap; Gemco.
d. R-150; Gemco.
e. S-150; Gemco.

4. Insulation Standoff:

a. Clutch Clip; Gemco.

5. Anchor Adhesives:

a. TACTOO Adhesive; AGM Industries, Inc.
b. Tuff Bond Hanger Adhesive; Gemco.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and to determine if other conditions affecting performance of insulation are satisfactory. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or that interfere with insulation attachment.

3.3 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.

B. Install insulation that is undamaged, dry, unsoiled, and has not been exposed at any time to ice and snow.

C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

3.4 INSTALLATION OF PERIMETER AND UNDER-SLAB INSULATION

A. On vertical surfaces, set units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.

B. Protect below-grade insulation on vertical surfaces from damage during backfilling by applying protection board. Set in adhesive according to written instructions of insulation manufacturer.

C. Protect top surface of horizontal insulation from damage during concrete work by applying protection board.

3.5 INSTALLATION OF GENERAL BUILDING INSULATION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Seal joints between closed-cell (nonbreathing) insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

C. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.

1. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.

D. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:

1. Use blanket widths and lengths that fill cavities formed by framing members. Where more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
2. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

E. Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).

3.6 INSTALLATION OF VAPOR RETARDERS

A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

B. Seal vertical joints in vapor retarders over framing by lapping not less than 2 wall studs. Fasten vapor retarders to framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches (406 mm) o.c.

C. Seal overlapping joints in vapor retarders with adhesives or vapor-retarder tape according to vapor retarder manufacturer's instructions. Seal butt joints and fastener penetrations with vapor-retarder tape. Locate all joints over framing members or other solid substrates.

D. Firmly attach vapor retarders to substrates with mechanical fasteners or adhesives as recommended by vapor retarder manufacturer.

E. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.

F. Repair any tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

3.7 PROTECTION

A. General: Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07210

SECTION 07533 - THERMOPLASTIC SINGLE-PLY MEMBRANE ROOFING

Part 1 - General Conditions

1.01 Description:

1. Scope:

A. Install fire barrier and adhered flexible single ply roof membrane, and flashing to obtain a Roofing Systems Warranty.

1.02 Quality Assurance:

1. This roofing system shall be applied only by a contractor authorized by the membrane manufacturer to provide the specified roofing assembly and required warranty.

2. A representative of the roofing membrane manufacturer shall be present prior to the installation of the new roofing system to review the existing conditions on the project to ensure that site conditions are addressed. The same technician that reviewed the project prior to the commencement of work on this project shall be present upon completion of the roofing project to conduct a final inspection of the roofing installation.

3. There shall be no deviations made from the contract specification or the approved shop drawings without prior written approval by Prior and Associates Architects.

4. A copy of the contractor's 'Request for Warranty Application', approved and review stamped from the membrane manufacturer shall be provided in the submittal package prior to commencement of work on the project.

5. Those that shall be present at the final inspection of this project shall include a technical representative of the membrane manufacturer, the installer and a representative of the Owner. Arrangements for this final inspection shall be made by the roof installer.

1.03 Submittals:

1. Following acceptance of proposal, the installer shall submit copies of the following:

A. 1. Letter from the primary roofing manufacturer that the installer can meet criteria specified in these bid documents.
2. Current spec-data sheets that identify typical performance properties of the products to be installed.
3. Material Safety Data Sheets for products used on this project.

B. A copy of the specification that has been reviewed, signed and dated as approved by the manufacturer. (Manufacturer's reviewed Request for Warranty form and acceptance is be acceptable)

E. Shop drawings which shall include:

1. Outline of roof and installation sequence.
2. Profile details of flashing methods for penetrations and terminations.

3. Technical acceptance from membrane manufacturer.

F. Certification by producers of roofing that all materials supplied complies with all requirements of the identified industry standards. Roofing membrane shall be:

1. Roof membrane shall have a protective membrane surface coating to resist accumulation of air borne contaminants such as pollution and dust etc.
2. Certification that the membrane has a positive installed track record equal in length of the warranty period.

G. Certify that system specified meets all Local, State and Federal building and Safety code and insurance requirements. Installer shall obtain and pay for all required permits.

H. Installers Certificate's of Insurance for General Liability and Workers Compensation.

1.04 Product Delivery, Storage and Handling:

1. All products delivered to the job site shall be in the original, unopened containers or wrappings.

2. Handle all materials so as to prevent damage. Place all materials on pallets and fully protect from moisture with a clean canvas tarpaulin.

3. Membrane rolls shall be stored lying down on pallets and fully protected from moisture with a clean canvas tarpaulin.

4. Adhesives shall be stored at temperatures above 40 degrees F.

5. All flammable materials shall be stored in a cool, dry area away from sparks and open flames. Follow precautions outlined on container or as supplied by material manufacturer/supplier.

6. Any materials that are determined by the owner's representative and the manufacturer to be damaged or un-acceptable are to be removed from the job site and replaced at no cost to the owner.

1.05 Job Conditions:

1. Roofing materials may be installed under the following weather conditions (extreme temperatures, moisture, humidity), but only after consulting with the manufacturer as the performance of the roofing materials as well as installation costs and production may be effected.

2. Only as much of the new roofing as can be made weather tight each day, including flashing work, shall be installed each day.

3. All work shall be scheduled and executed without exposing the interior building areas to the effects of inclement weather. The existing building and its contents shall be protected against all risks.

4. All surfaces to receive thermal barrier, membrane and flashing shall be thoroughly dry. Should surface moisture occur, the contractor shall remove wet materials and replace with new dry materials.

5. All new construction, including equipment and accessories, shall be secured in such a manner, and at all times, so as to preclude wind blow-off or wind damage.

6. Temporary water stops shall be installed at the end of each days work and shall be removed before proceeding with the next days work. Water stops shall be compatible with all materials and shall not emit dangerous or incompatible fumes.

7. Arrange work sequence so as to avoid the use of the newly installed roofing for storage, walking surfaces and equipment movement. Where such access is absolutely required, the contractor shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. Both plywood and polyester felt protection shall be provided for all new and existing roof areas which receive traffic during construction.

9. Prior to and during application, all dirt, debris and dust shall be removed from surfaces by vacuuming, or blowing with compressed air and/or similar methods.

10. The contractor shall comply with all safety regulation as recommended by OSHA and local health and safety requirements.

11. All scrap roofing, flashing and metal work from construction shall be immediately removed and disposed by the roofing contractor to a legal dumping area authorized to receive such materials.

12 The contractor should take care during application and storage that overloading of the deck and structure does not occur.

14. Liquid materials such as solvents and adhesives shall be stored off site and installed away from open flames, sparks and excessive heat. Site storage is acceptable if liquid materials are placed in a locked, sealed storage container.

15. If any unusual or concealed condition is discovered, stop work and notify the owner immediately verbally and in writing.

16. Site clean up, including both interior and exterior building areas that have been affected by construction, shall be completed to the owner's satisfaction.

1.06 Bidding Requirements:

The installer shall provide to the owner in conjunction with their bid proposal, a letter from the membrane manufacturer and Insurance companies, that shall affirm that the following conditions are met:

1. Affirmation that the installer is authorized and approved by the manufacturer to install the manufacturer's roofing system.

2. Affirmation that the manufacturer and installer have reviewed the project specifications and agrees to <u>all</u> conditions and requirements contained therein.

3. A certificate of insurance for workers compensation and general liability.

1.07 WARRANTY

1. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

2. Warranty requirements:

   a. Minimum general contractors workmanship 5 year warranty period as per DFCM contractors warranty at the end of this section.
   b. Minimum 20 year manufacturers roofing system warranty as per DFCM warranty at the end of this section
   c. See D.F.C.M. warranty at end of specification.

Part 2 - Products

2.01 General:

1. The components of this roof system are to be products of one manufacturer as indicated in the contract documents. Products not supplied by primary roof membrane manufacturer, shall be identified as being compatible, acceptable and under warranty by the membrane manufacturer.

2. Acceptable Manufacturers and roof membrane for use on this project is Sarnafil and shall comply to the following requirements:

   A. Sarnafil G 410 Colored Fully Adhered Membrane (OR PRE BID APPROVED EQUAL BY OTHERS)

   .060 minimum thickness, glass fiber reinforced Polyvinyl Chloride membrane meeting the following properties:

Description	Test method	Properties
Reinforcing Materials		Fiberglass
Color:	As selected from above listed full product line	
Overall thickness	Micrometer	0.060
Minimum shrinkage		.02%
Tensile Strength, min/PSI (Mpa)	ASTM D638	1600 (1.5)
Elongation @ Break, min	ASTM D638	250 M.D./250 C.M.D.
Seam strength, min.,(% of tensile strength)	ASTM D638	80
Retention of Properties after heat aging	ASTM D3045	
Tensile Strength,min.,(% of original)	ASTM D638	95
Elongation, min., (% of original)	ASTM D638	90
Tearing Resistance,. Min.,lbf (N)	ASTM D1004	14 (63.0)
Low Temperature Bend, -40 deg (-40 deg C)	D2136	Pass
Accelerated weathering (Xenon Arc)	ASTM D2565	10,000 hours
Cracking (7x magnification)		None
Discoloration (observation)		
Negligible		
Crazing (7x magnification)		None
Linear dimensional Change	ASTM D1204	0.02 %
Weight Change after immersion in water	ASTM D570	2.5 %
Static Puncture resistance, 33 lbf (15 kg)	ASTM 5602	Pass

Dynamic Puncture Resistance, 7.3 ft-lbf (10J)	5635	Pass

2.02 Related Materials:

1. Membrane adhesive shall be supplied by the membrane manufacturer.
   Acceptable adhesive shall include:
   A. Solvent or water based adhesive meeting current VOC requirements.
   B. As required by Membrane manufacturer.

2. Membrane Cleaner, Bonding Cement, Multi-purpose Sealant, Flashing, Termination Bars, Mechanical Fastener's, Water Cut off Mastic and pourable sealer as manufactured and supplied by the membrane manufacturer.

3. Membrane Flashing::

   A. Inside/outside corners or vent stacks shall be field fabricated fiberglass reinforced membrane in the same color as field membrane. Supplied by the membrane manufacturer.

4. Fasteners : Able to fasten into masonry wood and steel, as required by membrane manufacturer.

5. Underlayment Attachment Disc:

   A. Special 20-gauge 'flat' sarnaplate low profile, corrosion resistant plate for the securement of roof underlayment and limit protrusion through membrane.

6. Membrane Cleaner:

   A solvent cleaner for removal of adhesives from lap areas and for removal of contaminants from the roofing membrane as supplied by the membrane manufacturer.

7. EPS Tapered Insulation

   A. 2.0 l.b. Expanded Polystyrene ¼" tapered insulation system.

8. Underlayment:

   A. Thermal Barrier. A leveling layer, fire resistant smooth board used to achieve various fire ratings and aesthetic values. Approved or supplied by membrane manufacturer.
      1. 1/2 inch thick silicone-treated gypsum core with a glass mat facer used in mechanically fastened or solvent based adhesively applied roof membrane installations. Dens Deck manufactured by Georgia Pacific Corporation.

9. Sealants:

   Caulking / sealants which are provided will be accepted for use with this installation based on chemical compatibility with the specified membranes:

   A. Multi purpose sealant tape or sealant in caulking tubes. As supplied by membrane manufacturer.

10. Coated Metal

    A. 25 gauge galvanized PVC coated steel sheets. Color to match roof membrane color or as directed by Gardner Partnership Architects. Membrane cover strips to match colored metal shall be

provided by manufacturer as part of the flashing package. Steel flashing shall be formed to meet project termination and flashing requirements. Supplied and warranted by membrane manufacturer.

Part 3 - Execution

3.01 General:

The roofing contractor shall coordinate this installation of the roofing system with the General Contractor . Installer shall coordinate the set up and staging locations to minimize traffic and logistic complications.

3.02 Substrate Preparation:

1. A proper substrate shall be provided to receive the roofing membrane and flashing assembly.

2. The roofing installer shall inspect the substrate for defects such as excessive roughness, contaminated surfaces structurally unsound substrates, etc., that will adversely effect the quality of installation.

3. The substrate shall be clean, smooth, dry and free from flaws, sharp edges, loose and foreign materials, oil and grease. Roofing shall not start until all defects have been corrected.

4. All roof surfaces shall be free from water, ice or snow.

3.03 Installation of the thermal barrier

1. Thermal barrier shall be installed over wood decking in straight parallel courses. Joints staggered a minimum of 24 inches. No gaps or spaces shall be present in the surface of the thermal barrier.

2. Manufacturers flat attachment plates shall be used to fasten thermal barrier to the wood substrate and <u>not</u> protrude through finished roof membrane surface.

3.04 Installation of the Roof Membrane

The substrate shall be dry, clean and smooth with no excessive surface roughness, contamination or unsound surfaces such as broken or damaged thermal barrier boards.

1. Ensure that water does not flow beneath any completed sections of the roof membrane by completing all flashing, termination and seals by the end of each work period.

2. Blow all loose debris from the substrate.

3. Position first roll of PVC membrane at the designed starting point on roof. Roof slopes greater than ½ inch in 12 inches should have membrane strapped with shingled laps rather than installed parallel to the roof eave edge.

4. Chalk a line to ensure proper positioning of the membrane.

5. Unroll membrane 10 to 15 feet to ensure proper positioning of the membrane.

6. Apply adhesive as directed by membrane manufacturer. Roll membrane into adhesive without wrinkles and voids. Apply pressure to installed membrane with a weighted roller as directed by manufacturer.

7. Once the first roll is installed, repeat process outlined in 5 and 6 with all additional rolls.

8. Shingle over laps as required by membrane manufacturer.

9. Keep membrane overlaps to be hot air welded clean and free of adhesive and other contaminants.

3.05 Membrane seaming

1. Clean splice area of field dirt, adhesive or other residue.

2. Hot air weld as directed by membrane manufacturer

3.06 Membrane Flashing:

All flashing shall be installed concurrently with the roof membrane as the job progresses. No temporary flashing shall be allowed. If any water is allowed to enter under the new roofing due to incomplete flashing, the effected area shall be removed and replaced at the contractor's expense. Flashing shall be fully attached to compatible, dry smooth and solvent-resistant surfaces.

NOTES:

(a) Drying time increases with cooler temperatures and high humidity conditions. The contractor shall check with the membrane manufacturer's representative prior to proceeding with roofing operations on such days.

(b) The installer shall count the amount of adhesive used per square and shall count the number of buckets of adhesive used per day to verify conformance to the manufacturer's specified adhesive rate.

(c) All flashing shall extend a minimum of 8 inches above the finished roof level.

(d) All membrane flashing shall be adhered to the substrate.

(e) All flashing membranes shall be mechanically attached along the top edge as designed and required by the roof membrane manufacturer.

(f) Flashing shall be terminated according to the manufacturer's recommended methods and published details.

3.07 Coated Metal Flashing

All metal flashing shall be attached and fabricated according to the primary roofing manufacturers requirements. The use of hold down clips and anchors shall be required at drip edges and rake flashing.

1. Unless otherwise specified drip edge shall match membrane in color.
2. Fabrication shall include a hold down clip, bond breaker tape and membrane cover strips at each metal junction.

END OF SECTION

SECTION 07920 - JOINT SEALANTS

1.1 GENERAL

A. Preconstruction Joint-Sealant-Substrate Tests: Submit substrate materials, representative of actual joint surfaces, to joint sealant manufacturer for laboratory testing of joint sealants for adhesion to primed and unprimed substrates and for compatibility with joint substrates and other joint-related materials.

B. Submittals: In addition to Product Data, submit the following:

1. Samples of each type and color of joint sealant required.
2. Test reports for joint sealants evidencing compliance with requirements.

1.2 PRODUCTS

A. Elastomeric Sealant Manufacturers: Subject to compliance with requirements, provide sealants by one of the following:

1. Silicone Sealants:

   a. Bostik Inc.
   b. Dow Corning.
   c. NUCO Industries, Inc.
   d. Polymeric Systems, Inc.
   e. Sonneborn Building Products Div., ChemRex Inc.
   f. Tremco.

2. Urethane Sealants:

   a. W.R. Meadows, Inc.
   b. Sika Corporation.
   c. Sonneborn Building Products Div., ChemRex Inc.
   d. Tremco.

B. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by testing and field experience.

C. Colors: Provide colors indicated for exposed joint sealants or, if not indicated, as selected by Architect from manufacturer's full range for this characteristic.

D. Elastomeric Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant of base polymer specified below:

1. Mildew-Resistant Silicone Sealant: Type S; Grade NS; Class 25; Uses NT, G, A, and O; formulated with fungicide; intended for sealing interior joints with nonporous substrates exposed to high humidity and temperature extremes.

E. Multicomponent Pourable Urethane Sealant: Where joint sealants of this type are indicated, provide products complying with the following:

1. Products: **Provide one of the following**
   a. Pourthane; W.R. Meadows, Inc.
   b. Elasto-Thane 920 Pourable; Pacific Polymers, Inc.
   c. PSI-551/RC-2; Polymeric Systems, Inc.
   d. Sikaflex - 2c SL; Sika Corporation.
   e. SL 2; Sonneborn Building Products Div., ChemRex Inc.
   f. THC-901; Tremco.

2. Type and Grade: M (multicomponent) and P (pourable).
3. Class: 25.
4. Use Related to Exposure:**T (traffic)**
5. Uses Related to Joint Substrates: M, A,
6. Applications: Exterior Concrete Walkways

F. Single-Component Nonsag Urethane Sealant: Type S; Grade NS; and as follows:

   a. Class 12-1/2.
   b. Class 25.
   c. Uses NT, M, G, A, and O.
   d. Uses NT, M, A, and O.

F. Latex Sealant: ASTM C 834.

G. Sealant Backings, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

H. Cylindrical Sealant Backings: ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

   1. Type C: Closed-cell material with a surface skin.

I. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F (minus 32 deg C).

J. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint.

K. Primer: As recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated.

1.3 EXECUTION

A. General: Comply with joint sealant manufacturer's instructions for products and applications indicated.

B. Sealant Installation Standard: Comply with ASTM C 1193.

END OF SECTION 07920

SECTION 08110 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes steel doors and frames.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 8 Section "Door Hardware" for door hardware and weatherstripping.
2. Division 9 Section "Gypsum Board Assemblies" for spot grouting frames in gypsum board partitions.
3. Division 9 Section "Painting" for field painting primed doors and frames.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of door and frame specified, including details of construction, materials, dimensions, hardware preparation, core, label compliance, sound ratings, profiles, and finishes.

C. Shop Drawings showing fabrication and installation of steel doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of door and frame hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.

D. Door Schedule: Submit schedule of doors and frames using same reference numbers for details and openings as those on Contract Drawings.

1.4 QUALITY ASSURANCE

A. Provide doors and frames complying with ANSI/SDI 100 "Recommended Specifications for Standard Steel Doors and Frames" and as specified.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.

B. Inspect doors and frames on delivery for damage. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect; otherwise, remove and replace damaged items as directed.

C. Store doors and frames at building site under cover. Place units on minimum 4-inch- (100-mm-) high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber. If cardboard wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch (6-mm) spaces between stacked doors to promote air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Steel Doors and Frames:

   a. Amweld Building Products, Inc.
   b. Benchmark Commercial Doors.
   c. Ceco Door Products.
   d. Copco Door Co.
   e. Curries Co.
   f. Deansteel Manufacturing Co.
   g. Fenestra Corp.
   h. Kewanee Corp.
   i. Mesker Door, Inc.
   j. Pioneer Industries.
   k. Republic Builders Products.
   l. Steelcraft.

2.2 MATERIALS

A. Hot-Rolled Steel Sheets and Strip: Commercial-quality carbon steel, pickled and oiled, complying with ASTM A 569 (ASTM A 569M).

B. Cold-Rolled Steel Sheets: Carbon steel complying with ASTM A 366 (ASTM A 366M), commercial quality, or ASTM A 620 (ASTM A 620M), drawing quality, special killed.

C. Galvanized Steel Sheets: Zinc-coated carbon steel complying with ASTM A 526 (ASTM A 526M), commercial quality, or ASTM A 642 (ASTM A 642M), drawing quality, hot-dip galvanized according to ASTM A 525, with A 60 or G 60 (ASTM A 525M, with Z 180 or ZF 180) coating designation, mill phosphatized.

D. Supports and Anchors: Fabricated from not less than 0.0478-inch- (1.2-mm-) thick steel sheet; 0.0516-inch- (1.3-mm-) thick galvanized steel where used with galvanized steel frames.

E. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where items are to be built into exterior walls, hot-dip galvanize complying with ASTM A 153, Class C or D as applicable.

2.3 DOORS

A. Steel Doors: Provide 1-3/4-inch- (44-mm-) thick doors of materials and ANSI/SDI 100 grades and models specified below, or as indicated on Drawings or schedules:

1. Exterior Doors: Grade II, heavy-duty, Model 1, full flush design, minimum 0.0516-inch- (1.3-mm-) thick galvanized steel sheet faces.

2.4 FRAMES

A. Provide metal frames for doors, transoms, sidelights, borrowed lights, and other openings, according to ANSI/SDI 100, and of types and styles as shown on Drawings and schedules. Conceal fastenings, unless otherwise indicated. Fabricate frames of minimum 0.0478-inch- (1.2-mm-) thick cold-rolled steel sheet.

1. Fabricate frames with mitered or coped and continuously welded corners.
2. Form exterior frames from 0.0785-inch- (2.0-mm-) thick galvanized steel sheet.

B. Plaster Guards: Provide minimum 0.0179-inch- (0.45-mm-) thick steel plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.

C. Grout: grout all frames solid.

2.5 FABRICATION

A. Fabricate steel door and frame units to be rigid, neat in appearance, and free from defects, warp, or buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site. Comply with ANSI/SDI 100 requirements.

1. Internal Construction: One of the following manufacturer's standard core materials according to SDI standards:

a. Unitized steel grid.

b. Clearances: Not more than 1/8 inch (3.2 mm) at jambs and heads.

B. Fabricate exposed faces of doors and panels, including stiles and rails of nonflush units, from only cold-rolled steel sheet.

C. Tolerances: Comply with SDI 117 "Manufacturing Tolerances Standard Steel Doors and Frames."

D. Fabricate concealed stiffeners, reinforcement, edge channels, and moldings from either cold- or hot-rolled steel sheet.

E. Galvanized Steel Doors, Panels, and Frames: For the following locations, fabricate doors, panels, and frames from galvanized steel sheet according to SDI 112. Close top and bottom edges of doors flush as an integral part of door construction or by addition of minimum 0.0635-inch- (1.6-mm-) thick galvanized steel channels, with channel webs placed even with top and bottom edges. Seal joints in top edges of doors against water penetration.

1. At exterior locations.

F. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.

G. Thermal-Rated (Insulating) Assemblies: At exterior locations and elsewhere as shown or scheduled, provide doors fabricated as thermal-insulating door and frame assemblies and tested according to ASTM C 236 or ASTM C 976 on fully operable door assemblies.

1. Unless otherwise indicated, provide thermal-rated assemblies with U-value rating of 0.41 Btu/sq. ft. x h x deg F (2.33 W/sq. m x K) or better.

H. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements of SDI 107 and ANSI A115 Series specifications for door and frame preparation for hardware.

I. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.

J. Locate hardware as indicated on Shop Drawings or, if not indicated, according to the Door and Hardware Institute's (DHI) "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

2.6 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual" for recommendations relative to applying and designating finishes.

B. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for steel sheet finishes.

C. Apply primers and organic finishes to doors and frames after fabrication.

2.7 GALVANIZED STEEL SHEET FINISHES

A. Surface Preparation: Clean surfaces with nonpetroleum solvent so that surfaces are free of oil or other contaminants. After cleaning, apply a conversion coating of the type suited to the organic coating applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.

1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint 20.

B. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply air-dried primer specified below immediately after cleaning and pretreatment.

1. Shop Primer: Zinc-dust, zinc-oxide primer paint complying with performance requirements of FS TT-P-641, Type II.

2.8 STEEL SHEET FINISHES

A. Surface Preparation: Solvent-clean surfaces to comply with SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel to comply with SSPC-SP 5 (White Metal Blast Cleaning) or SSPC-SP 8 (Pickling).

B. Pretreatment: Immediately after surface preparation, apply a conversion coating of type suited to organic coating applied over it.

C. Factory Priming for Field-Painted Finish: Apply shop primer that complies with ANSI A224.1 acceptance criteria, is compatible with finish paint systems indicated, and has capability to provide a sound foundation for field-applied topcoats. Apply primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.

B. Placing Frames: Comply with provisions of SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

1. Except for frames located in existing concrete, masonry, or gypsum board assembly construction, place frames before constructing enclosing walls and ceilings.
2. !nstall at least 3 wall anchors per jamb at hinge and strike levels.

C. Door Installation: Fit hollow-metal doors accurately in frames, within clearances specified in ANSI/SDI 100.

3.2 ADJUSTING AND CLEANING

A. Prime Coat Touchup: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

B. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION 08110

SECTION 08550 – METAL CLAD WOOD WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following wood-window types:

1. Awning windows.

B. Related Sections include the following:

1. Division 6 Section "Finish Carpentry" for interior and exterior wood trim not included as part of wood window units.

1.3 DEFINITIONS

A. Performance-grade number, included as part of the window designation system, is the actual design pressure in pounds force per square foot (pascals) used to determine the structural test pressure and water test pressure.

1. Structural test pressure, wind-load test, is equivalent to 150 percent of the design pressure.
2. Water-leakage-resistance test pressure is equivalent to 10 percent of the design pressure with 2.86 lbf/sq. ft. (137 Pa) as a minimum.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide wood windows engineered, fabricated, and installed to withstand normal thermal movement, wind loading, and impact loading without failure, as demonstrated by testing manufacturer's standard window assemblies representing types, grades, and sizes required for this Project according to test methods indicated.

B. Standards: Performance requirements for operating force, air infiltration, water penetration, structural performance, and forced-entry resistance for wood windows are those specified in NWWDA I.S. 2, "Industry Standard for Wood Window Units."

C. Test Criteria: Testing shall be performed by a qualified independent testing agency based on the following criteria:

1. Design wind velocity at Project site is 70 mph (113 km/h).
2. Heights of window units above grade at the window centerline are indicated or can be determined from the Drawings. Consult with the Architect, if necessary, to confirm required loading and test pressures.

3. Test Procedures: Test window units according to ASTM E 283 for air infiltration, ASTM E 547 for water penetration, and ASTM E 330 for structural performance.

D. Performance Requirements: Testing shall demonstrate compliance with requirements indicated in NWWDA I.S. 2 for operating force, air infiltration, water penetration, structural performance, and forced-entry resistance for the type and performance grade of window units required. Where required design pressure exceeds the minimum for the specified window grade, comply with requirements of NWWDA I.S. 2, Article 6, "Optional Performance Classifications," for higher than minimum performance grades.

1. Operating Force: The amount of force required to start and to maintain the sash in motion shall not exceed 25 lbf (111 N).
2. Air-Infiltration Rate for Operating Units: Not more than 0.37 cfm/ft. (2.06 cu. m/h per m) of operable sash joint for an inward test pressure of 1.57 lbf/sq. ft. (75 Pa).
3. Water Penetration: No water penetration as defined in the test method at an inward test pressure of 10 percent of the structural test pressure.
4. Structural Performance: No failure or permanent deflection in excess of 0.4 percent of any member's span after removing the imposed load, for a positive (inward) and negative (outward) test pressure of 22.5 lbf/sq. ft. (1077 Pa).
5. Thermal Transmittance: Provide window units, labeled and certified according to the National Fenestration Rating Council's Product Certification Program, with the following U-value as determined according to NFRC 100.
   a. U-Value: 0.60 Btu/sq. ft. x h x deg F (3.41 W/sq. m x K) for operable, double-glazed, metal-clad, wood window units.

1.5 SUBMITTALS

A. Product Data: For each type of wood window required. Include the following:

1. Construction details and fabrication methods.
2. Profiles and dimensions of individual components.
3. Data on hardware, accessories, and finishes.
4. Recommendations for maintenance and cleaning of exterior surfaces.

B. Shop Drawings: For each type of window required. Include information not fully detailed in manufacturer's standard Product Data and the following:

1. Layout and installation details, including anchors.
2. Elevations at 1/4 inch = 1 foot (1:50) scale and typical window unit elevations at 3/4 inch = 1 foot (1:20) scale.
3. Full-size section details of typical composite members, including reinforcement and stiffeners.
4. Hardware, including operators.
5. Glazing details.
6. Accessories.

C. Samples for Initial Selection: One 12-inch- (300-mm-) long section of window members. Where finishes involve normal color variations, include Sample sets showing the full range of variations expected.

D. Samples for Verification: The Architect reserves the right to require additional Samples that show fabrication techniques, workmanship, and design of hardware and accessories.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firms whose windows have been certified under NWWDA's "Hallmark Program" for wood window units are listed in the current NWWDA "Membership and Product Directory" and comply with requirements indicated.

1. Provide only wood window units bearing an NWWDA "Hallmark Program" label certifying compliance with NWWDA I.S. 2.

B. Testing Agency Qualifications: To qualify for approval, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria, that it has the experience and capability to conduct the testing indicated without delaying the Work.

C. Source Limitations: Obtain wood window units through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, dimensional requirements, and aesthetic effects of wood windows and are based on the specific window types and models indicated. Other manufacturers' products with equal performance characteristics may be considered provided deviations in size, profile, and dimensions are minor and do not alter the aesthetic effect. Refer to Division 1 Section "Substitutions."

E. Glazing Standards: Comply with recommendations of GANA's "Glazing Manual" and "Sealant Manual," unless more stringent requirements are indicated.

F. Insulating-Glass Certification Program: Provide insulating-glass units permanently marked on spacers or at least on one component pane of units with the appropriate certification label of the inspecting agency indicated below:

1. Insulating Glass Certification Council.
2. Associated Laboratories, Inc.
3. National Certification Testing Laboratories.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify window openings by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating wood windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.8 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Warranty Period for Insulating Glass: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering window units that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturer: Subject to compliance with requirements, provide window units by one of the following:

1. Aluminum-Clad Wood Window Units:

a. Hurd Millwork Co.
b. Marvin Windows.
c. Pella Corporation.
d. Pozzi Wood Windows.
e. Weather Shield Mfg., Inc.

2.2 MATERIALS

A. General: Comply with NWWDA I.S. 2.

B. Wood: Clear ponderosa pine or other suitable fine-grain lumber, kiln dried to a moisture content of 6 to 12 percent at time of fabrication and free of visible finger joints, blue stain, knots, pitch pockets, and surface checks larger than 1/32 inch (0.8 mm) wide by 2 inches (51 mm) long.

1. Lumber shall be water-repellent preservative treated after machining per NWWDA I.S. 4.

C. Aluminum Cladding: Manufacturer's standard aluminum formed sheet or extruded cladding mechanically bonded to exterior wood sash and frame members.

1. Trim Members: Provide aluminum-clad wood, hollow-aluminum extrusions, or roll-formed aluminum trim members.
2. Finish: Factory-applied, baked-on enamel finish.

a. Color: Color as selected by the Architect from manufacturer's standard color range.

D. Anchors, Clips, and Accessories: Fabricate anchors, clips, and window accessories of aluminum, nonmagnetic stainless steel, or hot-dip zinc-coated steel or iron complying with requirements of ASTM B 633 for SC 3 (severe) service condition; provide sufficient strength to withstand design pressure indicated.

E. Fasteners: Comply with NWWDA I.S. 2 for fabrication and with manufacturer's recommendations and standard industry practices for type and size of installation fasteners.

1. Use zinc-coated or nonferrous nails and screws for window fabrication and installation.
2. Use brass screws for hardware and accessory installation.

F. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action, and completely concealed when sash is closed.

1. Weather-Stripping Material: Molded, expanded, EPDM or neoprene gaskets complying with ASTM C 509, Grade 4.

G. Wire-Fabric Insect Screen: 18-by-14 (1.2-by-1.6-mm) or 18-by-16 (1.2-by-1.4-mm) mesh of 0.013-inch-(0.3-mm-) diameter, coated aluminum wire, complying with FS RR-W-365, Type VII.

2.3 HARDWARE

A. General: Provide manufacturer's standard hardware, necessary to operate, tightly close, and securely lock windows. Do not use aluminum in frictional contact with other metals.

1. Provide metal hardware with a special coating finish and plated steel or brass/bronze operating bars and rods.

2.4 ACCESSORIES

A. Insect Screens: Provide insect screens for each operable exterior sash or ventilator. Locate screens on inside or outside of window sash or ventilator, depending on window type. Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches.

1. Screen Frames: Fabricate frames of tubular-shaped, extruded- or formed-aluminum members of 0.040-inch- (1-mm-) minimum wall thickness, with mitered or coped joints and concealed mechanical fasteners. Provide removable PVC spline/anchor concealing edge of screen frame. Comply with SMA 1004.

   a. Finish: Anodized aluminum or baked-on organic coating in color selected by the Architect from manufacturer's standards.

2. Wickets: Provide either sliding or hinged-type wickets, framed and trimmed for a tight fit and durability during handling.

2.5 AWNING WINDOWS

A. Window Grade: Comply with requirements of NWWDA Performance Grade DP15.

B. Glazing: provide manufacturers 1" double glazed insulated units, glazing to be obscure

C. Hardware: Provide the following equipment and operating hardware:

1. Operating Device: Lever-type operator located on jamb at sill.
2. Hinges: Concealed four-bar friction hinges (two per ventilator) located on each jamb near top rail.
3. Limit Device: Manufacturer's standard limit device (two per ventilator) located on each jamb.
4. Cam latch or other latching hardware with lever handle or pull.

Hardware: Provide the following equipment and operating hardware:

2.6 FABRICATION

A. General: Fabricate wood window units to comply with indicated standards. Include a complete system for assembly of components and anchorage of window units.

1. Comply with requirements of NWWDA I.S. 2 for moisture content of lumber at time of fabrication.

B. Fabricate windows to produce units that are reglazable without dismantling sash framing. Provide openings and mortises precut, where possible, to receive hardware and other items.

1. Provide removable insect screen for each window
2. Factory-Glazed Window Units: Except for light sizes in excess of 100 united inches (2500 mm width plus length), glaze window units in the factory before delivery.

C. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to the Project site, to the maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

2.7 FINISHES

A. Wood Finish: Provide the following finish on exposed wood in units:

1. Shop-Finished Units: Provide manufacturer's standard shop finish, consisting of prime coat and two finish coats, 3-mil (0.08-mm) dry film thickness, applied to interior wood surfaces.

a. Color: As selected by the Architect from manufacturer's standard range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings before installation. Verify that opening is correct and sill plate is level. Proceed with installation only after unsatisfactory conditions have been corrected.
1. Wood frame walls shall be dry, clean, sound, well-nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (75 mm) of corner.
2. Coordinate window installation with wall flashings and other built-in components.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions and recommendations for installing window units, hardware, operators, accessories, and other components of the Work.

B. Set window units level, plumb, true to line, without warp or rack of frames or sash. Provide proper support and anchor securely in place.

C. Set sill members in a bed of sealant or with joint fillers or gaskets, as indicated, to provide weathertight construction.

3.3 ADJUSTING

A. Adjust operating sash and hardware to provide a tight fit at contact points and weather stripping for smooth operation and a weathertight closure. Lubricate hardware and moving parts.

3.4 CLEANING

A. Clean interior and exterior surfaces immediately after installation. Exercise care to avoid damage to protective coatings and finishes. Remove excess glazing and sealants, dirt, and other substances.

B. Clean glass of factory-glazed units immediately after installing windows. Wash and polish glass on both faces before Substantial Completion. Comply with manufacturer's recommendations for final cleaning and maintenance. Remove nonpermanent labels from glass surfaces.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during the construction period.

3.5 PROTECTION

A. Protect window units from damage or deterioration until the time of Substantial Completion.

END OF SECTION 08550

SECTION 08625 - TUBULAR DAYLIGHTING SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Tubular daylighting system, consisting of roof dome, reflective tube, and diffuser assembly; configuration as indicated on the drawings.

B. Accessories.

1.2 RELATED SECTIONS

A. Section 07530 - Membrane Roofing.

B. Section 07600 – Flashing: Metal flashings.

1.3 REFERENCES

A. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2001.

B. ASTM A 463/A 463M - Standard Specification for Steel Sheet, Aluminum Coated, by the Hot Dip Process; 2001a.

C. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc Coated (Galvanized), by the Hot Dip Process; 2001a.

D. ASTM E 283 - Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

E. ASTM E 308-95 - Standard Practice for Computing the Colors of Objects by Using the CIE System

F. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls and Doors.

G. ASTM E 331 - Test Method for Water Penetration of Exterior Windows, Curtain walls and Doors by Static Air Pressure Difference.

H. ASTM D 635 - Test Method for Rate of Burning and/or Extent of Time of Burning of Self-Supporting Plastics in a Horizontal Position.

I. ASTM D-1929 - Test Method for Ignition Properties of Plastics.

J. UL 181 - Factory Made Air Ducts and Air Connectors; 1998

K. UL 790 - Standard for Tests for Fire Resistance of Roof Covering Materials; 1997.

L. ICBO/ICC AC-16 - Acceptance Criteria for Plastic Skylights; 2003.

1.4 PERFORMANCE REQUIREMENTS

A. Completed tubular daylighting system assemblies shall be capable of meeting the following performance requirements:
   1. Air Infiltration Test: Air infiltration will not exceed .30 cfm/sf aperture with a pressure delta of 1.57 psf across the tube when tested in accordance with ASTM E 283.
   2. Water Resistance Test: No uncontrolled water leakage at 16.5 psf pressure differential with water rate of 5 gallons/hours/sf when tested in accordance with ASTM E 331.
   3. Uniform Load Test:
      a. No breakage, permanent damage to fasteners, hardware parts, or damage to make system inoperable or cause permanent deflection of any section in excess of 1 percent of its span at a Positive Load of 110 psf (5.27 kPa) or Negative Load of 60 psf (2.87 kPa).
      b. No breakage, permanent damage to fasteners, hardware parts, or damage to make tubular skylight inoperable or cause permanent deflection of any section in excess of 1 percent of its span at a Positive or Negative Load of 35 psf (1.68 kPa).
      c. All units shall be tested with a safety factor of (3) for positive pressure and (2) for negative pressure, acting normal to plane of roof in accordance with ASTM E 330.
   4. Fire Testing:
      a. Class B Burning Brand – The burning brand shall self-extinguish without transferring the fire to the dome Per: U.B.C. Standard 15-2 Class B Burning Brand Test. See ASTM E 108 and UL 790.
      b. Self-Ignition Temperature - Greater than 650 degrees F Per: U.B.C. Standard 26-6. See ASTM D-1929-68 (1975).
      c. Smoke Density - Rating no greater than 75 Per: U.B.C. Standard 26-5. (See ASTM D-2843-70) or no greater than 450 Per U.B.C. 8-1 (See ASTM Standard E 84-91A) in way intended for use.
      d. Rate of Burn - Minimum Burning Rate: 2.5 inches/min (64 mm/min) Classification CC-2: U.B.C. Standard 26-7. See ASTM D 635-74.

1.5 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings. Submit shop drawings showing layout, profiles and product components, including anchorage, flashings and accessories.

D. Verification Samples: As requested by Architect.

E. Test Reports: Independent testing agency or evaluation service reports verifying compliance with specified performance requirements.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Engaged in manufacture of tubular skylights for minimum 10 years.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

A. Tubular Daylighting System: Manufacturer's standard warranty for 10 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Solatube International, Inc or pre bid approved equal.; 2210 Oak Ridge Way, Vista, CA 92081. ASD. Tel. Toll Free: 888-765-2882. Tel: (760) 477-1120. Fax: (760) 597-4488. Email: commsales@solatube.com. Web: http://www.solatube.com.

B. Substitutions: Equal by others Pre-Bid Approval

2.2 TUBULAR DAYLIGHTING SYSTEM

A. Tubular Daylighting System General : Transparent roof-mounted skylight dome and self-flashing curb, reflective tube, and ceiling level diffuser assembly, transferring sunlight to interior spaces; complying with ICBO/ICC AC-16.

B. SolaMaster Series: Solatube Model 21-C Self Flashing, Penetrating Ceiling, 21 inch (530 mm) Daylighting System:
   a. Glazing: Type DP, 0.125 inch (3.2 mm) minimum thickness polycarbonate classified as CC1 material.
   2. LightTracker Reflector, made of aluminum sheet, thickness 0.015 inch (0.4 mm) with Spectralight Infinity. Positioned in the dome to capture low angle sunlight.
   3. Roof Flashing Base: One piece, seamless, leak-proof flashing functioning as base support for dome and top of tube.
      a. Base Material: Sheet steel, corrosion resistant conforming to ASTM A 653/A 653M or ASTM A 463/A 463M, 0.028 inch (0.7 mm) thick.
      b. Base Style: Type F08, Self mounted, 8 inches (203 mm) high.
      c. Flashing Insulator: Type F1, Thermal isolation material for use under flashing.
   4. Dome Ring: Attached to top of base section; 0.090 inch (2.3 mm) nominal thickness injection molded high impact PVC; to prevent thermal bridging between base flashing and tubing and channel condensed moisture out of tubing.
   5. Dome Seal: Polypropylene Fiber Pile weatherstrip 0.27 inch (6.85mm) by 0.27 inch (6.85mm).
   6. Reflective Tube: Aluminum sheet, thickness 0.018 inch (0.5 mm).

a. Interior Finish: Spectralight Infinity high reflectance specular finish on exposed reflective surface. Visible spectrum (400 nm to 760 nm) greater than 99 percent. Total solar spectrum (400 nm to 2500 nm) less than 93 percent.
b. Color: a* and b* (defined by CIE L*a*b* color model) shall not exceed plus 2 or be less than minus 2 as determined in accordance to ASTM E 308.

7. Reflective 30 degree Adjustable Tube: Aluminum sheet, thickness of 0.018 inch (0.5 mm)
   a. Interior Finish: Spectralight Infinity high reflectance specular finish on exposed reflective surface. Visible spectrum (400 nm to 760 nm) greater than 99 percent. Total solar spectrum (400 nm to 2500 nm) less than 93 percent.
8. Diffuser Assemblies for Tubes Penetrating Ceilings: Solatube Model 21-C. Ceiling mounted box transitioning from round tube to square ceiling assembly, supporting light transmitting surface at bottom termination of tube, with compression seal to minimize condensation and bug or dirt infiltration; 23.8 by 23.8 inches (605 by 605 mm) square frame to fit standard suspended ceiling grids or hard ceilings.
   a. Lens: Type L1 OptiView Fresnel lens design to maximize light output and diffusion with extruded aluminum frame. Visible Light Transmission shall be >90 percent at 0.022 inch (0.6 mm) thick.
   b. Seal: Closed cell foam, 3 pounds per cubic foot (48 kg per cubic meter).

2.3 ACCESSORIES

A. Fasteners: Same material as metals being fastened, non-magnetic steel, non-corrosive metal of type recommended by manufacturer, or injection molded nylon.

B. Suspension Wire: Steel, annealed, galvanized finish, size and type for application and ceiling system requirement.

C. Sealant: Polyurethane or copolymer based elastomeric sealant as provided or recommended by manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's printed instructions.

B. After installation of first unit, field test to determine adequacy of installation. Conduct water test in presence of Owner, Architect, or Contractor, or their designated representative. Correct if needed before proceeding with installation of subsequent units.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 08710--FINISH HARDWARE

PART 1 --GENERAL

1.1 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.

1.2 DESCRIPTION OF WORK

A. Definition: "Finish Hardware" includes items known commercially as finish hardware which are required for swing, sliding and folding doors, except special types of unique and non-matching hardware specified in the same section as the door and door frame.

B. Extent of finish hardware required is indicated on drawings and in schedules.

C. Types of finish hardware required include the following:

Butt Hinges
Lock cylinders and keys
Lock and latch sets
Closers
Door trim units

1.3 RELATED SECTIONS

A. Division 8 - Steel Doors and Frames.

1.4 QUALITY ASSURANCE

A. Manufacturer: Obtain each type of hardware (latch and locksets, etc.) from a single manufacturer

B. Supplier: A recognized architectural finish hardware supplier, with warehousing facilities, who has been furnishing hardware in the project's vicinity for a period of not less than 2 years, and who is, or who employs an experienced architectural hardware consultant who is available, at reasonable times during the course of the work, for consultation about project's hardware requirements, to Owner, Architect and Contractor.

C. Fire-Rated Openings: Provide hardware for fire-rated openings in compliance with NFPA Standard No. 80 and local building code requirements. Provide only hardware which has been tested and listed by UL or an approved testing agency for types and sizes of doors required and complies with requirements of door and door frame labels.

D. Where emergency exit devices are required on fire-rated doors (with supplementary marking on doors with labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide labels on exit devices indicating "Fire Exit Hardware

E. This supplier shall be responsible to field check existing openings for proper application of sizes and strikes for all openings.

1.5 REGULATORY REQUIREMENTS

A. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibilities Guidelines for Buildings and Facilities (ADAAG)," ANSI A117.1, FED-STD-795, "Uniform Federal Accessibility Standards."

1.6 SUBMITTALS

A. Product Data: Submit manufacturers technical product data for each item of hardware in accordance with Division-1 section "Submittals". Include whatever information may be necessary to show compliance with requirements, and include instructions for installation and for maintenance of operating parts and finish.

B. Hardware Schedule: Submit final hardware schedule in a vertical format as recognized by the Door and Hardware Institute (DHI). Horizontal schedule format will not be accepted. Coordinate hardware with doors, frames and related work to ensure proper size, thickness, hand, function and finish of hardware.

1. Final Hardware Schedule Content: Based on finish hardware indicated, organize hardware schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:

a. Type, style, function, size and finish of each hardware item.
b. Name and manufacturer of each item.
c. Fastenings and other pertinent information.
d. Index to include location of hardware set cross-referenced to indications on drawings both on floor plans and in door and frame schedule.
e. Explanation of all abbreviations, symbols, codes, etc., contained in schedule.
f. Mounting locations for hardware.
g. Door and frame sizes and materials.
h. Keying information.
i. Wiring diagrams with theory of operation.

C. Submittal Sequence: Submit schedule in accordance to Division 1, particularly where acceptance of hardware schedule must precede fabrication of other work (e.g., hollow metal frames) which is critical in the project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by finish hardware, and other information essential to the coordinated review of hardware schedule.

D. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.

E. Samples if Requested: Prior to submittal of the final hardware schedule and prior to final ordering of finish hardware, submit one sample of each type of exposed hardware unit, finish as required, and tagged with full description for coordination with schedule. Return to project in time for installation.

F. Templates: Furnish hardware templates to each fabricator of doors, frames and other work to be factory-prepared for the installation of hardware. Upon request, check shop drawings of such other work, to confirm that adequate provisions are made for proper location and installation of hardware.

1.7 PRODUCT HANDLING

A. Tag each item or package separately, with identification related to final hardware schedule, and include basic installation instructions with each item or package.

B. Inventory hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

C. Deliver individually packaged hardware items at the proper times to the proper locations (shop or project site) for installation.

D. Provide secure lock-up for hardware delivered to the project, but not yet installed. Control handling and installation of hardware items which are not immediately replaceable, so that completion of the work will not be delayed by hardware losses, both before and after installation.

1.8 "OR EQUAL" PROVISIONS

A. The Contractor shall be responsible for supplying the primary product listed as the quality standard or a model, which is equal to the primary specified model in regards to specified function, quality, finish, sizes, accessories, options, durability, warranty, parts availability and listing approvals. If it is determined by the Owner or its appointed representative at any time during the bidding review, construction or installation, and prior to the final acceptance of the Project, that the "or equal" model submitted by the Contractor is not equal to the primary specified model, the Contractor shall assume all costs to replace the model submitted, with an approved equal model.

B. The bidders shall submit a list in their bids providing manufacturer and model for all equipment in this section, which they propose to provide. The Owner will determine if the items so proposed meet the quality standards set by the specification.

PART 2—PRODUCTS

2.1 SCHEDULED HARDWARE

A. Requirements for design, grade, function, finish, size and other distinctive qualities of each type of finish hardware is indicated in the Finish Hardware Data Sheet and Hardware Schedule at the end of this section. Products are identified by using hardware designation numbers of the following.

B. Manufacturer's Product Designations:

Butt Hinges:	Ives
Locksets:	Schlage
Closers:	LCN
Kickplates:	Ives
Floor/Wall Stops:	Ives
Threshold & Weatherstrip	National Guard Products

2.2 MATERIALS AND FABRICATION

A. General:

1. Hand of door: Drawings show direction of slide, swing or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.
2. Manufacturer's Name Plate: Do not use manufacturer's products which have manufacturer's name or trade name displayed in a visible location (omit removable nameplates), except in conjunction with required UL labels and as otherwise acceptable to Architect.
3. Manufacturer's identification will be permitted on rim of lock cylinders only.
4. Finish: All hardware finish shall match US32D unless otherwise indicated. Closer bodies, covers and arms shall be powder-coated finishes.
5. Lockset Design: Lever handle design shall be similar to 07 A as manufactured by Schlage Lock Co.
6. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware which has been prepared for self-tapping sheet metal screws, except as specifically indicated.
7. Furnish screws for installation, with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of such other work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.
8. Provide concealed fasteners for hardware units which are exposed when door is closed, except to extent no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work, except where it is not feasible to adequately reinforce the work. In such cases, provide sleeves for each thru-bolt or use sex screw fasteners.
9. Tools and Maintenance Instructions for Maintenance: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of finish hardware.

2.3 HINGES, BUTTS AND PIVOTS

A. Templates: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

B. Screws: Furnish Phillips flat-head or machine screws for installation of units, except furnish Phillips flat-head or wood screws for installation of units into wood. Finish screw heads to match surface of hinges or pivots.

C. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:

1. Steel Hinges: Steel pins.
2. Non-ferrous Hinges: Stainless steel pins.
3. Out-swing Corridor Doors: Non-removable pins.
4. Interior Doors: Non-rising pins.
5. Tips: Flat button and matching plug, finished to match leaves.
6. Number of hinges: Provide number of hinges indicated but not less than 3 hinges per door leaf for doors 90" or less in height and one additional hinge for each 30" of additional height.

D. Furnish hinges in sizes and types as required by architect's details to achieve maximum degree of opening.

E. Acceptable Manufacturers:

1. Ives
2. McKinney
3. Hager

2.4 LOCK CYLINDERS AND KEYING

A. General: Supplier will meet with Owner to finalize keying requirements and obtain final instructions in writing.

B. Review the keying system with the Owner and match existing key system. If key pinning charts are required, owner to furnish charts to hardware supplier.

C. Furnish temporary keyed cores for the construction period, and remove these when directed. The construction cores remain property of the supplier and shall be returned to the supplier when they are removed. Contractor shall install the permanent cores in the presence of the owner's representative.

D. Metals: Construct lock cylinder parts from brass/bronze, stainless steel or nickel silver.

E. Comply with 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.

F. Permanently inscribe each key and cylinder with Visual Key Control that identifies cylinder manufacturer key symbol, and inscribe key with the notation "DO NOT DUPLICATE".

G. Key Material: Provide keys of nickel silver only.

H. Key Quantity:

1. Furnish 3 change keys for each lock.
2. 5 master keys for each master system.
3. 5 grandmaster keys for each grandmaster system.
4. One extra blank for each lock.
5. 3 Control Keys.
6. 6 Construction master keys.

J. Deliver keys to Owner's representative.

2.5 LOCKS, LATCHES AND BOLTS

A. Mortise Locksets and Latchsets: as scheduled.

1. Chassis: cold-rolled steel, handing field-changeable without disassembly.
2. Latchbolts: ¾ inch throw stainless steel anti-friction type.
3. Lever Trim: through-bolted, accessible design, cast lever or solid extruded bar type levers as scheduled. Filled hollow tube design unacceptable.

   a. Spindles: security design independent break-away. Breakage of outside lever does not allow access to inside lever's hubworks to gain wrongful entry.

4. Thumbturns: accessible design not requiring pinching or twisting motions to operate.

5. Deadbolts: stainless steel 1-inch throw.
6. Strikes: 16 gage curved steel, bronze or brass with 1 inch deep box construction, lips of sufficient length to clear trim and protect clothing.
7. Scheduled Lock Series and Design: Schlage L series, 07 A design 630 finish.
8. Certifications:

   a. ANSI A156.13, 1994, Grade 1 Operational, Grade 1 Security.
   b. ANSI/ASTM F476-84 Grade 31 UL Listed

B. Comply with UL requirements for throw of bolts and latch bolts on rated fire openings.

C. Lock Manufacturers: Subject to compliance with requirements, provide lockset products of the following approved manufacturers:

1. Schlage Lock Co. "L Series"
2. Sargent Lock Co. "8200-Series"
3. Corbin/Russwin Lock Co. "ML2000 Series"

D. Flush Bolt Heads: Minimum of 1/2" diameter rods of brass, bronze or stainless steel, with minimum 12" long rod for doors up to 7'-0" in height. Provide longer rods as necessary for doors exceeding 7'-0" in height.

E. Provide dust-proof strikes for foot bolts, except where special threshold construction provides non-recessed strike for bolt.

2.6 CLOSERS AND DOOR CONTROL DEVICES

A. Size of Units: Except as otherwise specifically indicated, comply with the manufacturer's recommendations for size of door control unit, depending upon size of door, exposure to weather and anticipated frequency of use.

B. Closers: All door closers shall be of one manufacturer to provide for proper installation and servicing after installation. All closers shall be inspected after installation by a factory representative to ensure proper adjustment and operation. Closer shall carry a manufacturer's 10 year warranty for hydraulic units and 2 year warranty for electrical and/or handicap power assist door closers against manufacturing defects and workmanship.

C. Cylinder: Shall be of high strength cast iron construction. All door exterior closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified independent testing laboratory. A written certification showing successful completion of a minimum of 10,000,000 cycles for all exterior door closers must be provided. Cylinder shall have been manufactured and in the marketplace for a minimum of 10 years.

D. All door closers shall be fully hydraulic and have full rack and pinion action. Closer shall utilize full complement bearings at shaft. Pinion and pistons shall be hardened regardless of closer size. The closer shall incorporate tamper resistant non-critical screw valves of V-slot design to reduce possible clogging. Closer shall have separate and independent screw valve adjustments for latch speed, general speed and hydraulic backcheck. Backcheck shall be properly located so as to effectively slow the swing of the door at a minimum of 10 degrees in advance of the dead stop location. Pressure relief valves are not acceptable.

E. All door closers shall pass UL10C positive pressure fire test.

F. Parallel Arm Closers: Shall incorporate one piece solid forged steel arms with bronze bushings. All other closers to have forged steel main arms for strength, and durability.

G. All closers to have a powder coat finish on closer body, arm, metal cover and adapter plate. Powder coat finish shall exceed a minimum 100 hour salt spray test, as described in ANSI Standard A156.4 and ASTM B117.

H. Hydraulic Fluid: All closers, with the exception of interior and interior electronic closers, shall utilize temperature stable fluid capable of withstanding temperature ranges of 120 degrees F. to -30F. without requiring seasonal adjustment of closer speed to properly close the door.

I. Supply all drop plates, shoe supports, templates, etc. to properly install closers according to manufacturer's recommendations.

J. Closer being submitted for approval shall have been manufactured for at least 10 years. A list of (10) year old projects using submitted closer shall be available upon request.

K. All door closers shall be furnished with metal covers.

L. Closer Manufacturers: Subject to compliance with requirements, provide closer products of the following approved manufacturers:

1. LCN Closers – 4041, 4041 EDA
2. Sargent Closers – 281, 281 P10
3. Corbin/Russwin – DC2000, DC2000 A3

2.7 DOOR TRIM UNITS

A. Fasteners: Provide manufacturer's standard exposed fasteners for door trim units (kick plates, edge trim, viewers, knockers, mail drops and similar units); either machine screws or self-tapping screws.

B. Fabricate edge trim of stainless steel, not more than 1/2" nor less than 1/16" smaller in length than door dimension.

C. Fabricate protection plates (armor, kick or mop) not more than 1-1/2" less than door width on stop side and not more than 1/2" less than door width on pull side, x the height indicated.

D. Where existing doors are receiving new hardware, provide new protection plates on all doors that have existing plates, if not already specified. New plates are to be of equal or greater size than existing plates.

E. Metal Plates: Stainless steel, .050" (U.S. 18 ga.).

F. Acceptable Manufacturers:

1. Ives
2. Rockwood
3. Quality

2.8 WEATHERSTRIP AND GASKETING

A. General: Except as otherwise indicated, provide continuous weather stripping at each leaf of every exterior door. Provide type, sizes and profiles shown or scheduled. Provide non-corrosive fasteners as recommended by manufacturer for application indicated.

B. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips is easily replaceable and readily available from stocks maintained by the manufacturer.

C. Acceptable Manufacturers:

1. Pemko
2. National Guard Products
3. Zero

2.9 THRESHOLDS

A. General: Except as otherwise indicated provide standard aluminum threshold unit of type, size and profile as shown or detailed.

B. Provide welded custom thresholds where scheduled and noted in the hardware sets. Provide cover plates where scheduled.

C. Provide thresholds that are 1" wider than depth of frame

D. Acceptable Manufacturers:

1. National Guard Products
2. Pemko
3. Zero

2.10 DOOR SILENCERS

All hollow metal frames shall have grey resilient type silencers. Quantity (3) on single doors and quantity (2) on pairs of doors.

PART 3--EXECUTION

3.1 INSTALLATION

A. Hardware specified under this section for aluminum doors will be coordinated and delivered in a timely manner to aluminum door manufacturer for installation on aluminum doors prior to delivery to project. This coordination will not impede delivery of storefront or securing exterior of building during construction.

B. Mount hardware units at heights indicated in "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute, except as specifically indicated or required to comply with governing regulations, and except as may be otherwise directed by Architect.

C. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, coordinate removal, storage and reinstallation or application of

surface protections with finishing work specified in the Division-9 sections. 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. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant.

3.2 ADJUST AND CLEAN

A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.

B. Clean adjacent surfaces soiled by hardware installation.

C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

D. Instruct Owner's Personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.

3.3 HARDWARE SCHEDULE

HW SET: 01
DOOR NUMBER:
100A 104A

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
1	EA	DEADBOLT	B663P	626	SCH
1	EA	PUSH PLATE	8200 6" X 16"	630	IVE
1	EA	PULL PLATE	8302-0 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	4111 SCUSH X 30 X 61	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	SET	SEALS	700SA	AL	NGP
1	EA	DOOR SWEEP	95WH	AL	NGP

HW SET: 02
DOOR NUMBER:
101A 102A 103A

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
1	EA	STOREROOM LOCK	L9480P 07A	630	SCH
1	EA	OVERHEAD STOP	900S	630	GLY
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	SET	SEALS	700SA	AL	NGP
1	EA	DOOR SWEEP	95WH	AL	NGP
1	EA	THRESHOLD	896V	AL	NGP

09200-PART 1 – CEMENT PLASTER SYSTEM

1.1 SECTION INCLUDES

A. Refer to all drawings and other sections of this specification to determine the type and extent of work therein affecting the work of this section, whether or not such work is specifically mentioned herein.

B. System Description: Composite wall system consisting of SENERGY STUCCOBASE PREMIX and Finish Coat.

C. Senergy products are listed in this specification to establish a standard of quality. Any substitutions to this specification shall be submitted to and receive approval from the Architect at least 10 days before bidding. Proof of equality shall be borne by the submitter.

D. The system type shall be Stucco Wall System as manufactured by Degussa Wall Systems, Inc., Jacksonville, Florida.

1.2 REFERENCES

A. ASTM C150-99a Standard Specification for Portland Cement.

B. NER-676 National Evaluation Service Report NER-676.

C. ASTM C847-95 Standard Specification for Metal Lath.

D. ASTM C926-98a Standard Specification for Application of Portland Cement-Based Plaster.

E. ASTM C1032-96 Standard Specification for Woven Wire Plaster Base.

F. ASTM C1063-99 Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster.

G. ICBO AC11 Cementitious Exterior Wall Coatings.

H. ESR 1064 ICC Evaluation Report ESR 1064.

1.3 SUBMITTALS

A. Samples:

1. Submit a 18.8 cm x 18.8 cm (7" x 7") sample for each finish color and texture specified.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. The Stucco Wall System Applicator shall provide satisfactory evidence of his qualifications to apply the Stucco Wall System.

B. Design and Detailing a Stucco Wall System:

1. General:
   a. The system shall be installed in strict accordance with current recommended published details and product specifications from the system's manufacturer.
   b. Sealants and closed cell backer rod as required at dissimilar materials and expansion joints within the Stucco Wall System shall provide a complete watertight system.

c. Minimum slope for all projections shall be 1:2 with a maximum length of 30.5 cm (12") [e.g. 15 cm in 30.5 cm (6" in12")], unless other manufacturer-approved detailing is shown on the construction documents.

2. Substrate Systems:
   a. Deflection of the substrate systems shall not exceed L/360.
   b. Acceptable substrates are Fiberboard ANSI/AHA A194-85, Exposure I or exterior plywood (grade C-D or better) or Exposure I OSB,
   c. Acceptable substrates must be securely fastened per manufacturer recommendations and applicable building code requirements.
   d. Other substrates shall be approved by the system's manufacturer in writing prior to the application.
   e. The applicator shall verify that the proposed substrate is acceptable prior to the Stucco Wall System installation.
3. System Joints
   a. Expansion joints are required in the system where they exist in the substrate, where the system adjoins dissimilar construction, at changes in substrates and at floor lines in multilevel wood frame construction where substrates change and where structural movement is anticipated or as specified by the design professional.
   b. Control joints are required at a minimum of every 13.4 m2 (144 ft2) and as specified by the design professional. The maximum uncontrolled length or width is 5.5 lineal meters (18 lineal feet) and a maximum uncontrolled length to ratio of 2 1/2 : 1.
   c. Reference construction documents for specific locations.
4. Coordination with Other Trades
   a. Contractor shall evaluate adjacent materials such as windows, doors, etc. for conformance to manufacturer's details.

C. Evaluations, Listings, and Classifications

1. The Finish shall be tested as having a flame spread of less than or equal to 25.
2. The system shall be currently evaluated, listed and classified by the following agencies:
   a. I.C.B.O. Evaluation Report
   b. NES Evaluation Report

D. Code Approvals: The system shall be recognized for the intended use by applicable Building Codes.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver to the job site all materials in unopened, undamaged containers, clearly marked and identified with the system manufacturer's name and description of contents.

B. Store materials inside, or under cover and off the ground and keep them dry, protected from the weather, direct sun light, surface contamination, damaging temperatures, damage from construction traffic and other causes.

C. Store pail materials in temperatures not less than 4°C (104°F) or more than 43°C (110°F).

1.6 PROJECT/SITE CONDITIONS

A. Environmental Requirements: The contractor under this section shall verify site conditions to assure that the requirements of storage of materials and installation procedures conform to the system manufacturer's current product storage and application requirements as applicable to warranty conditions.

B. Protection of Work

1. Protect surrounding areas and surfaces during the application of the system.

2. The system shall be protected when work ceases for the day or when an area is completed so that water will not infiltrate behind the system or damage system materials.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate and schedule installation of Stucco Wall System with related work of other sections

B. Coordinate and schedule installation of trim, flashing, and joint sealers to prevent water infiltration behind the system.

C. Coordinate and schedule installation of windows, doors, A/C units, air seals etc.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. All components of the Stucco Wall System shall be obtained from the system manufacturer or through an authorized distributor.

2.2 MATERIALS

A. STUCCOBOND: Surface applied bonding agent and additive for SENERGY STUCCOBASETM/STUCCOBASE PREMIX. (or approved equal)

B. POLY 1: 100% acrylic stucco additive.

1. Stucco System 3: 3/4"–7/8" thick stucco Metal Lath or Woven/Welded Wire: (See also, Senergy Lath & Trim Accessories system support bulletin) [Minimum No. 17 gauge, 25.4 mm (1") galvanized steel, woven wire fabric is required. Other laths shall comply with ASTM C933-80 (welded) and ASTM C1032-86 (woven). The lath is self-furred or furred when applied over all substrates except unbacked polystyrene.]

- OR -

[Expanded metal lath: The lath shall comply with ASTM C847-93. Furring and self-furring requirements shall be as set forth for wire-fabric lath. Minimum weight is 1.85 kg/m2 (3.4 lb/yd2) Other acceptable welded laths shall comply with ASTM C933-80 and other acceptable woven laths shall comply with ASTM C1032-86.]

C. Plaster Sand: Must be clean and free from deleterious amounts of loam, clay, silt, soluble salts and organic matter. Sampling and testing must comply with ASTM C144 or ASTM C897.

D. Water: Clean and potable without foreign matter.

E. STUCCOBASETM PREMIX: Factory-blended mixture of Portland cement, reinforcing fibers, sand, and other proprietary ingredients.

F. Reinforcing Mesh: MIL-Y-1140G; balanced open weave, glass fiber reinforcing mesh; twisted multi-end strands for compatibility with Senergy lamina components. Flexguard 4: Standard weight for use with ALPHA BASE COAT in reinforcing optional EPS shapes.

G. Senergy STUCCO PRIME: 100% acrylic-based primer for stucco.

H. SENERLASTIC® Finish: Elastomeric factory-mixed formulation of 100% acrylic polymers and aggregate, integrally pigmented and formulated for specific textures. Senergy SENERLASTIC Finish or approved equal.

2.3 ACCESSORIES

A. A secondary weather barrier must be installed over sheathed substrates and wrapped into rough openings prior to installation of the Senergy Stucco Wall System. Suitable secondary weather barriers include minimum two layers Grade D 60 minute paper are required by Uniform Building Code (UBC) for wood-based sheathings. Suitable materials for wrapping into rough openings include: SENERFLASHTM: 30-mil thick, self-sealing, self-healing rubberized asphalt laminated to a polyester fabric.

B. Fasteners: Comply with ASTM C1063 for type and size required to hold materials securely in place.

C. Trim: Casing bead, corner bead, expansion joint and weep screed accessories shall meet the requirements of ASTM C1063, galvanized, meeting ASTM A525 and ASTM A526, or zinc meeting ASTM B69. Zinc accessories are recommended where highly humid or salt-laden service conditions exist.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Installer shall examine substrates to determine if they are in satisfactory condition to receive the Senergy Stucco Wall System. A satisfactory substrate is one that complies section 1.4.4. B of this specification with requirements including installation tolerance of 6.4 mm in 3 m (1/4" in 10') (min) and of the sections in which the substrate and related work are specified. Installer shall submit a written report listing conditions detrimental to performance of work of this section. Do not proceed with installation of system until unsatisfactory conditions have been corrected.

Wall System

B. Wrap the secondary weather barrier into rough openings (doors, windows, etc.) to increase the level of protection to the building frame and interior.

C. Verify lath is installed in accordance with ASTM C1063 and all local building codes.

D. Unsatisfactory conditions shall be reported to the General Contractor and corrected before application of the Senergy Stucco Wall System.

3.2 PREPARATION

A. At the Architect's discretion, installer, system manufacturer's representative, installer of substrate material and other trades whose work affects the Senergy Stucco Wall System shall meet at project site to review procedures and time schedule proposed for installation of the system and coordination with related work.

B. Comply with stucco wall systems current published instructions for installation of Stucco Wall System as applicable to each type of substrate indicated.

3.3 MIXING

General: No additives are permitted unless specified in product mixing instructions. Close containers when not in use. Prepare in a container that is clean and free of foreign substances. Do not use a container which has contained or been cleaned with a petroleum-based product. Clean tools with soap and water immediately after use.

A. Acrylic Additive
   1. Mix POLY 1 with clean potable water in a ratio of from 1:1 to 1:3.

B. Stucco Base Coat: SENERGY STUCCOBASETM
   1. Use mixer which is clean and free of foreign substances.
   2. Add 18.9–22.7 liters (5–6 gallons) of clean potable water or POLY 1, mixed at a 4:1 or 5:1 ratio, to mixer per one bag of SENERGY STUCCOBASE.
   3. Add one bag of SENERGY STUCCOBASE.
   4. Add one half 45.4–54.4 kg (100–120 lbs) of the required plaster sand (ASTM C144 or ASTM C897).
   5. Mix for 3–4 minutes at normal mixing speed while adding the remainder 45.4–54.4 kg (100–120 lbs) of the plaster sand. Allow material to set for 2–4 minutes, then remix adding water to achieve desired consistency.

   Note: Continuous mixing may cause excessive air entrainment.
   - OR -

B. Stucco Base Coat: SENERGY STUCCOBASE PREMIX
   1. Use mixer which is clean and free of foreign substances.
   2. Add 7.6–9.5 liters (2–2.5 gallons) of clean potable water to mixer.
   3. Slowly add one bag of SENERGY STUCCOBASE PREMIX.
   4. Mix for one minute at normal mixing speed. Allow material to set for 2–4 minutes with mixing blades at rest. Then re-mix, adding water to achieve desired consistency. Desired consistency varies with type of application (trowel or gun), Substrate (paper-backed lath or block) and whether the stucco is applied to a wall or a ceiling.

   Note: Continuous mixing may cause excessive air entrainment.

C. Senergy [SENERFLEX] [SENERLASTIC®] [STUCCO PRIME]
   1. Thoroughly mix the factory-prepared material with a mixer to a homogeneous consistency.
   2. A small amount of clean, potable water may be added to adjust workability.
   3. Additives are not permitted.
   4. Close container when not in use.
   5. Clean tools with soap and water immediately after use.

3.4 APPLICATION

General: Apply Stucco Wall System materials in accordance with Senergy specifications.

A. Apply to approved substrates in accordance with manufacturer's instruction and government code requirements.

B. Metal lath
   1. The metal lath shall be applied with minimum 13 mm (1/2") side laps and 25 mm (1") end laps.
   2. When end laps occur between supports, lace or wire ties the ends of the sheets with 1.2 mm (0.0475") galvanized annealed steel wire.]
   3. Refer to ASTM C1063 for additional information.
   4. Corrosion-resistant fasteners for lath attachment shall penetrate a minimum of 25 mm (1") into wood framing.
   5. Apply the System over steel framing [minimum No. 20 gauge, 0.912 mm (0.0359") thick]. Lath is secured to framing using No.8-18, S-12, panhead, self-tapping screws spaced a maximum of 152.4 mm (6 inches) vertical on center to studs.]

C. Trim junction

   1. When two pieces of trim abut:
      a. Set intersection of trim in a minimum 100 mm (4") bed of acceptable low module trim sealant.
      b. Allow 3–5 mm (1/8"–3/16") gap between the abutting trim pieces. Do not overlap trim.

c. Attach the trim in accordance with manufacturer's specifications. True expansion joints must be fastened to the structural substrate.

2. When two or more pieces of trim intersect:
   a. The vertical trim piece shall be continuous with all horizontal pieces.
   b. Miter all corners at intersections of trim.
   c. Set intersection of trim in a minimum 100 mm (4") bed of acceptable low module trim sealant.
   d. Allow 3–5 mm (1/8"–3/16") gap between the intersecting trim pieces. Do not overlap the trim.
   e. Attach the trim in accordance with manufacturers' specifications. True expansion joints must be fastened to the structural substrate.

NOTE: Control joints are required at a minimum of every 13.4 m2 (144 ft2) and as specified by the design professional. The maximum uncontrolled length or width is 5.5 lineal meters (18 lineal feet) and a maximum uncontrolled length to ratio of 2 1/2 : 1.

D. SENERGY STUCCOBASETM/STUCCOBASE PREMIX Base Coat: Stucco Wall System 3 Application (3/4"–7/8" thickness)

1. Total thickness of base coats must meet code requirements for fire rated construction.
2. Nominal plaster Base Coat thickness:
   a. First coat "scratch": 3/8"–1/2"
   b. Second coat "brown": 3/8"–1/2"
3. Apply SENERGY STUCCOBASE/STUCCOBASE PREMIX mixture with sufficient force to develop full adhesion between SENERGY STUCCOBASE/STUCCOBASE PREMIX mixture and the substrate.
4. Apply first coat to completely embed lath. Cross rake slightly to provide key for second brown coat. Coat must be uniform in thickness.
5. Apply second brown coat to provide the required total thickness. Coat must be uniform in thickness. Rod off to desired thickness, leveled with screeds, to provide a true, flat plane. Follow this by wood floating or darbying the surface. Fill all voids and dress surface for acrylic finish.
6. Damp cure for at least 48 hours by lightly and evenly fogging the surface with water a least twice a day. Directsunlight, hot temperatures, low humidity and wind may make additional fogging necessary.

E. Senergy STUCCO PRIME

1. Apply STUCCO PRIME to the SENERGY STUCCOBASE/STUCCOBASE PREMIX with a sprayer, 10 mm (3/8") nap roller, or good-quality latex paint brush at a rate of approximately 4.3–6.7 m2 per liter (175–275 ft2 per gallon).
2. STUCCO PRIME shall be dry to the touch before proceeding to the Senergy Finish Coat application.

F. Senergy Finish Coat

[SENERLASTIC®]: [FINE]
1. Apply Finish directly to the SENERGY STUCCOBASE/STUCCOBASE PREMIX or STUCCO PRIME with a clean stainless steel trowel.
2. Apply and level finish during same operation to minimum obtainable thickness consistent with uniform coverage.
3. Maintain a wet edge on finish by applying and texturing continually over the wall surface.
4. Work finish to corners, joints, or natural breaks and do not allow material to set up within an uninterrupted wall area.
5. Float finish to achieve final texture.

3.5 CLEANING

A. Clean adjacent surfaces and remove excess material, droppings, and debris.

SECTION 09255 - GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Gypsum board assemblies attached to wood framing.
2. Cementitious backer units installed with gypsum board assemblies.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 6 Section "Rough Carpentry" for wood framing and furring, and gypsum sheathing applied over wood framing.
2. Division 9 Section "Tile" for cementitious backer units installed as substrates for ceramic tile.

1.3 DEFINITIONS

A. Gypsum Board Construction Terminology: Refer to ASTM C 11 and GA-505 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.4 ASSEMBLY PERFORMANCE REQUIREMENTS

A. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those of assemblies whose STC ratings were determined according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.

B. Fire Resistance: Provide gypsum board assemblies with fire-resistance ratings indicated.

1.5 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of product specified.

C. Product certificates signed by manufacturers of gypsum board assembly components certifying that their products comply with specified requirements.

1.6 QUALITY ASSURANCE

A. Single-Source Responsibility for Panel Products: Obtain each type of gypsum board and other panel products from a single manufacturer.

B. Single-Source Responsibility for Finishing Materials: Obtain finishing materials from either the same manufacturer that supplies gypsum board and other panel products or from a manufacturer acceptable to gypsum board manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum panels flat to prevent sagging.

1.8 PROJECT CONDITIONS

A. Environmental Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C 840 requirements or gypsum board manufacturer's recommendations, whichever are more stringent.

B. Room Temperatures: For nonadhesive attachment of gypsum board to framing, maintain not less than 40 deg F (4 deg C). For adhesive attachment and finishing of gypsum board, maintain not less than 50 deg F (10 deg C) for 48 hours before application and continuously after until dry. Do not exceed 95 deg F (35 deg C) when using temporary heat sources.

C. Ventilation: Ventilate building spaces as required to dry joint treatment materials. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Gypsum Board and Related Products:

a. Domtar Gypsum.
b. Georgia-Pacific Corp.
c. National Gypsum Co.; Gold Bond Building Products Division.
d. United States Gypsum Co.

C. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work where proprietary gypsum wallboard is indicated include, but are not limited to, the following:

D. Products: Subject to compliance with requirements, provide one of the following products where proprietary gypsum wallboard is indicated:

1. Gyprock Fireguard C Gypsum Board; Domtar Gypsum.
2. Firestop Type C; Georgia-Pacific Corp.
3. Fire-Shield G; National Gypsum Co.; Gold Bond Building Products Division.
4. SHEETROCK Brand Gypsum Panels, FIRECODE C Core; United States Gypsum Co.
5. SHEETROCK Brand Gypsum Panels, ULTRACODE Core; United States Gypsum Co.

2.2 GYPSUM BOARD PRODUCTS

A. General: Provide gypsum board of types indicated in maximum lengths available that will minimize end-to-end butt joints in each area indicated to receive gypsum board application.

1. Widths: Provide gypsum board in widths of 48 inches (1219 mm).

B. Gypsum Wallboard: ASTM C 36 and as follows:

1. Type: Regular for vertical surfaces, unless otherwise indicated.
2. Type: Type X.
3. Type: Sag-resistant type for ceiling surfaces.
4. Edges: Tapered.
5. Thickness: 5/8 inch (15.9 mm) where indicated.

C. Exterior Gypsum Soffit Board: ASTM C 931, with manufacturer's standard edges, of type and thickness indicated below:

1. Type: Regular, unless otherwise indicated.
2. Type: Type X where required for fire-resistance-rated assemblies and where indicated.
3. Thickness: 5/8 inch (15.9 mm), unless otherwise indicated.

2.3 CEMENTITIOUS BACKER UNITS

A. Provide cementitious backer units complying with ANSI A118.9, of thickness and width indicated below, and in maximum lengths available to minimize end-to-end butt joints.

1. Thickness: 5/8 inch (15.9 mm), where indicated.
2. Width: Manufacturer's standard width, but not less than 32 inches (813 mm).

B. Available Products: Subject to compliance with requirements, cementitious backer units that may be incorporated in the Work include, but are not limited to, the following:

C. Products: Subject to compliance with requirements, provide one of the following products:

1. The Original Wonderboard; Custom Building Products.
2. Wonderboard Multi+Board; Custom Building Products.
3. DomCrete Cementitious Tile-Backer Board; Domtar Gypsum.
4. Util-A-Crete Concrete Backer Board; FinPan, Inc.
5. DUROCK Cement Board; United States Gypsum Co.

2.4 TRIM ACCESSORIES

A. Accessories for Interior Installation: Cornerbead, edge trim, and control joints complying with ASTM C 1047 and requirements indicated below:

1. Material: Formed metal or plastic, with metal complying with the following requirement:

a. Steel sheet zinc coated by hot-dip process or rolled zinc.
b. Steel sheet zinc coated by hot-dip or electrolytic process, or steel sheet coated with aluminum or rolled zinc.

2. Shapes indicated below by reference to Fig. 1 designations in ASTM C 1047:

a. Cornerbead on outside corners, unless otherwise indicated.
b. LC-bead with both face and back flanges; face flange formed to receive joint compound. Use LC-beads for edge trim, unless otherwise indicated.
c. L-bead with face flange only; face flange formed to receive joint compound. Use L-bead where indicated.
d. U-bead with face and back flanges; face flange formed to be left without application of joint compound. Use U-bead where indicated.
e. One-piece control joint formed with V-shaped slot and removable strip covering slot opening.

B. Accessory for Curved Edges: Cornerbead formed of metal, plastic, or metal combined with plastic, with either notched or flexible flanges that are bendable to curvature radius.

C. Accessories for Exterior Installations: Cornerbead, edge trim, and control joints formed from steel sheet zinc coated by hot-dip process or rolled zinc complying with ASTM C 1047, in shapes indicated below by reference to Fig. 1 designations in ASTM C 1047.

1. Edge trim complying with shape LC-bead per Fig. 1, unless otherwise indicated
2. Manufacturer: Subject to compliance with requirements, provide aluminum accessories by one of the following:

a. Fry Reglet Corp.
b. Gordon, Inc.
c. MM Systems, Inc.
d. Pittcon Industries, Inc.

2.5 JOINT TREATMENT MATERIALS

A. General: Provide joint treatment materials complying with ASTM C 475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.

B. Joint Tape for Gypsum Board: Paper reinforcing tape, unless otherwise indicated.

C. Joint Tape for Cementitious Backer Units: As recommended by cementitious backer unit manufacturer.

D. Drying-Type Joint Compounds for Gypsum Board: Factory-packaged vinyl-based products complying with the following requirements for formulation and intended use.

1. Ready-Mixed Formulation: Factory-mixed product.

a. Taping compound formulated for embedding tape and for first coat over fasteners and face flanges of trim accessories.
b. Topping compound formulated for fill (second) and finish (third) coats.

2. Job-Mixed Formulation: Powder product for mixing with water at Project site.

a. Taping compound formulated for embedding tape and for first coat over fasteners and face flanges of trim accessories.
b. Topping compound formulated for fill (second) and finish (third) coats.

E. Joint Compound for Cementitious Backer Units: Material recommended by cementitious backer unit manufacturer.

2.6 MISCELLANEOUS MATERIALS

A. General: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.

B. Spot Grout: ASTM C 475, setting-type joint compound recommended for spot-grouting hollow metal door frames.

C. Fastening Adhesive for Wood: ASTM C 557.

D. Steel drill screws complying with ASTM C 1002 for the following applications:
1. Fastening gypsum board to wood members.

E. Steel drill screws of size and type recommended by unit manufacturer for fastening cementitious backer units.

F. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.

G. Foam Gaskets: Closed-cell vinyl foam adhesive-backed strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit metal stud size indicated.

H. Sound-Attenuation Blankets: Unfaced mineral-fiber blanket insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665 for Type I (blankets without membrane facing).
1. Mineral-Fiber Type: Fibers manufactured from glass.

I. Thermal Insulation: Material indicated below, of thickness and width to fill voids formed by Z-furring members:

1. Unfaced Mineral-Fiber Blanket Insulation: Unfaced mineral-fiber blanket insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665 for Type I (blankets without membrane facing).
a. Mineral-Fiber Type: Fibers manufactured from glass.

J. Polyethylene Vapor Retarder: ASTM D 4397, thickness and maximum permeance rating as follows:
1. 6 mils (0.15 mm), 0.13 perms (7.5 ng/Pa x s x sq. m).

K. Vapor Retarder Tape: Pressure-sensitive tape of type recommended by vapor retarder manufacturer for sealing joints and penetrations in vapor retarder.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to which gypsum board assemblies attach or abut, installed hollow metal frames, cast-in-anchors, and structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Ceiling Anchorages: Coordinate installation of ceiling suspension systems with installation of overhead structural assemblies to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers that will develop their full strength and at spacing required to support ceilings.

3.3 APPLYING AND FINISHING GYPSUM BOARD, GENERAL

A. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C 840 and GA-216.

B. Install sound-attenuation blankets, where indicated, prior to installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

C. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

D. Install gypsum panels with face side out. Do not install imperfect, damaged, or damp panels. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

E. Locate both edge or end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Avoid joints other than control joints at corners of framed openings where possible.

F. Attach gypsum panels to framing provided at openings and cutouts.

G. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Instead, float gypsum panels over these members using resilient channels or provide control joints to counteract wood shrinkage.

H. Spot grout hollow metal door frames for solid-core wood doors, hollow metal doors, and doors over 32 inches (813 mm) wide. Apply spot grout at each jamb anchor clip and immediately insert gypsum panels into frames.

I. isolate perimeter of nonload-bearing gypsum board partitions at structural abutments, except floors, as detailed. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

J. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's recommendations.

1. Space screws a maximum of 12 inches (304.8 mm) o.c. for vertical applications.

K. Space fasteners in panels that are tile substrates a maximum of 8 inches (203.2 mm) o.c.

3.4 GYPSUM BOARD APPLICATION METHODS

A. Single-Layer Application: Install gypsum wallboard panels as follows:

1. On ceilings, apply gypsum panels prior to wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing), Use maximum-length panels to minimize end joints.

a. Stagger abutting end joints not less than one framing member in alternate courses of board.

B. Wall Tile Substrates: For substrates indicated to receive thin-set ceramic tile and similar rigid applied wall finishes, comply with the following:
1. Install cementitious backer units to comply with ANSI A108.11 at locations indicated to receive wall tile.

C. Single-Layer Fastening Methods: Apply gypsum panels to supports as follows:

1. Fasten with screws.

D. Direct-Bonding to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's recommendations, and temporarily brace or fasten gypsum panels until fastening adhesive has set.

E. Exterior Soffits and Ceilings: Apply exterior gypsum soffit board panels perpendicular to supports, with end joints staggered over supports.

1. Install with 1/4-inch (6.4-mm) open space where panels abut other construction or structural penetrations.
2. Fasten with corrosion-resistant screws.

3.5 INSTALLING TRIM ACCESSORIES

A. General: For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturer's directions for type, length, and spacing of fasteners.

B. Install cornerbead at external corners.

C. Install edge trim where edge of gypsum panels would otherwise be exposed. Provide edge trim type with face flange formed to receive joint compound, except where other types are indicated.

1. Install LC-bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.

2. Install L-bead where edge trim can only be installed after gypsum panels are installed.
3. Install U-bead where indicated.

3.6 FINISHING GYPSUM BOARD ASSEMBLIES

A. General: Treat gypsum board joints, interior angles, flanges of cornerbead, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration.

B. Prefill open joints, rounded or beveled edges, and damaged areas using setting-type joint compound.

C. Apply joint tape over gypsum board joints, except those with trim accessories having flanges not requiring tape.

D. Apply joint tape over gypsum board joints and to flanges of trim accessories as recommended by trim accessory manufacturer.

E. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.
   1. Level 4 for gypsum board surfaces, unless otherwise indicated.

F. Use one of the following joint compound combinations as applicable to the finish levels specified:

G. Use the following joint compound combination as applicable to the finish levels specified:

   1. Embedding and First Coat: Setting-type joint compound. Fill (Second) Coat: Setting-type joint compound. Finish (Third) Coat: Ready-mixed, drying-type, all-purpose or topping compound.

H. For Level 4 gypsum board finish, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration.

I. Finish exterior gypsum soffit board using setting-type joint compounds to prefill joints and embed tape, and for first, fill (second), and finish (third) coats, with the last coat being a sandable product. Smooth each coat before joint compound hardens to minimize need for sanding. Sand between coats and after finish coat.

   1. Painting exterior gypsum soffit board after finish coat has dried is specified in another Division 9 Section.

J. Finish cementitious backer units to comply with unit manufacturer's directions.

3.7 CLEANING AND PROTECTION

A. Promptly remove any residual joint compound from adjacent surfaces.

B. Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure gypsum board assemblies are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 09255

SECTION 09310 - CERAMIC TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Ceramic mosaic tile.
2. Glazed wall tile.
3. Waterproof membrane for thin-set tile installations.
4. Stone thresholds installed as part of tile installations.
5. Cementitious backer units.

B. Related Sections include the following:

1. Division 7 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
2. Division 9 Section "Gypsum Board Assemblies" for cementitious backer units installed in gypsum wallboard assemblies.

1.3 DEFINITIONS

A. Module Size: Actual tile size (minor facial dimension as measured per ASTM C 499) plus joint width indicated.

B. Facial Dimension: Actual tile size (minor facial dimension as measured per ASTM C 499).

C. Facial Dimension: Nominal tile size as defined in ANSI A137.1.

1.4 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:

1. Level Surfaces: Minimum 0.6.

1.5 SUBMITTALS

A. Product Data: For each type of tile, mortar, grout, and other products specified.

B. Tile Samples for Initial Selection: Manufacturer's color charts consisting of actual tiles or sections of tiles showing the full range of colors, textures, and patterns available for each type and composition of tile indicated. Include Samples of accessories involving color selection.

C. Grout Samples for Initial Selection: Manufacturer's color charts consisting of actual sections of grout showing the full range of colors available for each type of grout indicated.

D. Samples for Verification: Of each item listed below, prepared on Samples of size and construction indicated. Where products involve normal color and texture variations, include Sample sets showing the full range of variations expected.

1. Full-size units of each type of trim and accessory for each color required.
2. Stone thresholds in 6-inch (150-mm) lengths.

E. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

F. Product Certificates: Signed by manufacturers certifying that the products furnished comply with requirements.

G. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names of architects and owners, and other information specified.

H. Tile Test Reports: Indicate and interpret test results for compliance of special-purpose tile with specified requirements.

I. Setting Material Test Reports: Indicate and interpret test results for compliance of tile-setting and -grouting products with specified requirements.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed tile installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Source Limitations for Tile: Obtain each color, grade, finish, type, composition, and variety of tile from one source with resources to provide products from the same production run for each contiguous area of consistent quality in appearance and physical properties without delaying the Work.

C. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.

D. Source Limitations for Other Products: Obtain each of the following products specified in this Section from one source and by a single manufacturer for each product:

1. Stone thresholds.
2. Cementitious backer units.
3. Joint sealants.
4. Waterproofing.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.

B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

C. Handle tile with temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is completed and ambient temperature and humidity conditions are being maintained to comply with referenced standards and manufacturer's written instructions.

1.9 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated in the ceramic tile installation schedules at the end of this Section.

B. Products: Subject to compliance with requirements, provide products indicated in the ceramic tile installation schedules at the end of this Section.

C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

D. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Tile Products:
   a. Dal-Tile Corporation.
   b. Florida Tile Industries, Inc.
   c. Interceramics, USA.
   d. Mannington Ceramic Tile.

2. Tile-Setting and -Grouting Materials:

   a. American Olean Tile Company.

b. Dal-Tile Corporation.
c. DAP, Inc.
d. Mapei Corporation.

2.2 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard Grade requirements, unless otherwise indicated.
2. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting Materials" and "Grouting Materials" articles.

C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:

1. Match colors, textures, and patterns indicated by referencing manufacturer's standard designations for these characteristics.

D. Mounting: Where factory-mounted tile is required, provide back- or edge-mounted tile assemblies as standard with manufacturer, unless another mounting method is indicated.

2.3 TILE PRODUCTS

A. Unglazed Ceramic Mosaic Tile: Provide factory-mounted flat tile complying with the following requirements:

1. Composition: Porcelain.
2. Module Size: As noted at end of specification section.

B. Glazed Ceramic Mosaic Tile: Provide factory-mounted flat tile complying with the following requirements:

1. Composition: Porcelain.
2. Module Size: As noted at end of specification section.

C. Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with the following requirements:

1. Size: As indicated, coordinated with sizes and coursing of adjoining flat tile where applicable.
2. Shapes: As follows, selected from manufacturer's standard shapes:

a. Wainscot Cap for Thin-Set Mortar Installations: Surface bullnose.

2.4 STONE THRESHOLDS

A. General: Provide stone thresholds that are uniform in color and finish, fabricated to sizes and profiles indicated to provide transition between tile surfaces and adjoining finished floor surfaces.

1. Fabricate thresholds to heights indicated, but not more than 1/2 inch (12.7 mm) above adjoining finished floor surfaces, with transition edges beveled on a slope of no greater than 1:2.

B. Granite Thresholds: Provide granite thresholds complying with ASTM C 615 requirements.

1. Match Architect's sample for color and finish.

2.5 WATERPROOFING FOR THIN-SET TILE INSTALLATIONS

A. General: Provide products that comply with ANSI A118.10 and the descriptions in this Article.

B. Polyethylene-Sheet Waterproofing: Manufacturer's standard proprietary product consisting of composite sheets, 60 inches (152 mm) wide by a nominal thickness of 4 mils, composed of an inner layer of nonplasticized, chlorinated polyethylene sheet faced on both sides with laminated, high-strength, nonwoven polyester material, designed for embedding in latex-portland cement mortar and as the substrate for latex-portland cement mortar setting bed.

2.6 SETTING MATERIALS

A. Portland Cement Mortar Installation Materials: Provide materials complying with ANSI A108.1A and as specified below:

1. Cleavage Membrane: polyethylene sheeting ASTM D 4397, 4.0 mils (0.1 mm) thick.
2. Reinforcing Wire Fabric: Galvanized, welded wire fabric, 2 by 2 inches (50.8 by 50.8 mm) by 0.062-inch (1.57-mm) diameter; comply with ASTM A 185 and ASTM A 82, except for minimum wire size.
3. Expanded Metal Lath: Provide diamond-mesh lath complying with ASTM C 847 for requirements indicated below:

   a. Base Metal and Finish for Interior Applications: Fabricate lath from uncoated or zinc-coated (galvanized) steel sheet, with uncoated steel sheet painted after fabrication into lath.
   b. Configuration over Solid Surfaces: Self-furring.
   c. Weight: 2.5 lb/sq. yd. (1.4 kg/sq. m).

4. Latex additive (water emulsion) described below, serving as replacement for part or all of gaging water, of type specifically recommended by latex additive manufacturer for use with job-mixed portland cement and aggregate mortar bed.

   a. Latex Additive: Manufacturer's standard.
   b. Latex Additive: Acrylic resin.

B. Latex-Portland Cement Mortar: ANSI A118.4, composed as follows:

1. Prepackaged Dry-Mortar Mix: Factory-prepared mixture of portland cement; dry, redispersible, ethylene vinyl acetate additive; and other ingredients to which only water needs to be added at Project site.

a. For wall applications, provide nonsagging, latex-portland cement mortar complying with ANSI A118.4 for mortar of this type defined in Section F-2.1.2.

2. Mixture of Dry-Mortar Mix and Latex Additive: Mixture of prepackaged dry-mortar mix and liquid-latex additive complying with the following requirements:

a. Latex Additive: Acrylic resin.
b. For wall applications, provide nonsagging, latex-portland cement mortar complying with ANSI A118.4 for mortar of this type defined in Section F-2.1.2.

C. Organic Adhesive: ANSI A136.1, Type I.

2.7 GROUTING MATERIALS

A. Latex-Portland Cement Grout: ANSI A118.6 for materials described in Section H-2.4, composed as follows:

1. Factory-Prepared, Dry-Grout Mixture: Factory-prepared mixture of portland cement; dry, redispersible, ethylene vinyl acetate additive; and other ingredients to produce the following:

a. Unsanded grout mixture for joints 1/8 inch (3.2 mm) and narrower.

2. Mixture of Dry-Grout Mix and Latex Additive: Mixture of factory-prepared, dry-grout mix and latex additive complying with the following requirements:

a. Unsanded Dry-Grout Mix: Dry-set grout complying with ANSI A118.6 for materials described in Section H-2.3, for joints 1/8 inch (3.2 mm) and narrower.

2.8 ELASTOMERIC SEALANTS

A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements of Division 7 Section "Joint Sealants."

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.

C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and temperature extremes.

D. Available Products: Subject to compliance with requirements, products which may be incorporated into the Work include, but are not limited to, the following:

E. Products: Subject to compliance with requirements, provide one of the following:

1. One-Part, Mildew-Resistant Silicone Sealants:

a. Dow Corning 786; Dow Corning Corporation.
b. Sanitary 1700; GE Silicones.
c. Pecora 898 Sanitary Silicone Sealant; Pecora Corp.

d. Rhodorsil 6B White; Rhone-Poulenc, Inc.
e. Tremsil 600 White; Tremco, Inc.

2.9 CEMENTITIOUS BACKER UNITS

A. Provide cementitious backer units complying with ANSI A118.9, of thickness and width indicated below, and in maximum lengths available to minimize end-to-end butt joints.

1. Thickness: 5/8 inch (15.9 mm), where indicated.
2. Width: Manufacturer's standard width, but not less than 32 inches (813 mm).

B. Available Products: Subject to compliance with requirements, cementitious backer units that may be incorporated into the Work include, but are not limited to, the following:

C. Products: Subject to compliance with requirements, provide one of the following products:

1. The Original Wonderboard; Custom Building Products.
2. Wonderboard Multi+Board; Custom Building Products.
3. DomCrete Cementitious Tile-Backer Board; Domtar Gypsum.
4. Util-A-Crete Concrete Backer Board; FinPan, Inc.
5. DUROCK Cement Board; United States Gypsum Co.

2.10 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.11 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm; dry; clean; free from oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 series of tile installation standards for installations indicated.
2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust latter in consultation with Architect.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove coatings, including curing compounds, and other substances that contain soap, wax, oil, or silicone and are incompatible with tile-setting materials by using a terrazzo or concrete grinder, a drum sander, or a polishing machine equipped with a heavy-duty wire brush.

B. Provide concrete substrates for tile floors installed with dry-set or latex-portland cement mortars that comply with flatness tolerances specified in referenced ANSI A108 series of tile installation standards for installations indicated.

1. Use trowelable leveling and patching compounds per tile-setting material manufacturer's written instructions to fill cracks, holes, and depressions.
2. Remove protrusions, bumps, and ridges by sanding or grinding.

C. Blending: For tile exhibiting color variations within the ranges selected during Sample submittals, verify that tile has been blended in the factory and packaged so tile units taken from one package show the same range in colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

D. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent adhesion or staining of exposed tile surfaces by grout, protect exposed surfaces of tile against adherence of mortar and grout by precoating them with a continuous film of temporary protective coating indicated below, taking care not to coat unexposed tile surfaces:

1. Petroleum paraffin wax, applied hot.
2. Grout release.
3. Petroleum paraffin wax or grout release.

3.3 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.

C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are the same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets the same width as joints within tile sheets so joints between sheets are not apparent in finished work.

F. Lay out tile wainscots to next full tile beyond dimensions indicated.

G. Grout tile to comply with the requirements of the following tile installation standards:

1. For ceramic tile grouts (sand-portland cement, dry-set, commercial portland cement, and latex-portland cement grouts), comply with ANSI A108.10.

3.4 WATERPROOFING INSTALLATION

A. Install waterproofing to comply with waterproofing manufacturer's written instructions to produce a waterproof membrane of uniform thickness bonded securely to substrate.

B. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.5 FLOOR TILE INSTALLATION

A. General: Install tile to comply with requirements in the Ceramic Tile Floor Installation Schedule, including those referencing TCA installation methods and ANSI A108 series of tile installation standards.

B. Joint Widths: Install tile on floors with the following joint widths:

1. Ceramic Mosaic Tile: 1/16 inch (1.6 mm).

C. Back Buttering: For installations indicated, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards:
1. Tile floors in wet areas, including showers, tub enclosures, laundries, and swimming pools.
2. Tile floors composed of rib-backed tiles.

D. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile, unless otherwise indicated.

1. Set thresholds in latex-portland cement mortar for locations where mortar bed would otherwise be exposed above adjacent nontile floor finish.

3.6 WALL TILE INSTALLATION

A. Install types of tile designated for wall installations to comply with requirements in the Ceramic Tile Wall Installation Schedule, including those referencing TCA installation methods and ANSI setting-bed standards.

B. Joint Widths: Install tile on walls with the following joint widths:

1. Ceramic Mosaic Tile: 1/16 inch (1.6 mm).
2. Wall Tile: 1/16 inch (1.6 mm).

C. Back Buttering: For installations indicated, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards:

1. Tile wall installations in wet areas, including showers, tub enclosures, laundries, and swimming pools.

3.7 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove latex-portland cement grout residue from tile as soon as possible.
2. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to brick and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.

C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure tile is without damage or deterioration at the time of Substantial Completion.

1. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
2. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

3.8 CERAMIC TILE WALL INSTALLATION SCHEDULE

A. Ceramic wall tile installation at shower locations as per TCA, W244-03.

B. Ceramic Tile Wall Installation: Where interior wall installations is indicated, comply with the following:

1. Tile Type/Products: Wall tile as follows.

a. Dal-tile or equal, Style: Cotto Antico
b. Sizes: 13"x13" , 6"x13" decorative boarder and 3"x13" bullnose S-43E9
c. Color: As selected by architect from full product range

D. GROUT FOR WALLS, Mapei, provide sealer on all tile grout

3.9 CERAMIC MOSAICS UNGLAZED FLOOR TILE INSTALLATION SCHEDULE

A. Ceramic tile floor installation at floor drain receptors and floors as per TCA, B415-03

B. Ceramic tile floor installation at all other locations as per TCA, F121-03

C. Ceramic Floor Tile Installation: Where interior floor tile installations is indicated, comply with the following:

1. Tile Type/Products: Floor tile as follows.

a. Dal-tile or equal, Style: Cotto Antico.
b. Sizes: 13"x13" 6" x 6" decorative corner 6"x13" decorative boarder
c. Color: As selected by architect from full product range

E. GROUT FOR FLOOR, Mapei, provide sealer on all tile grout.

END OF SECTION 09310

SECTION 09653 - RESILIENT WALL BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Resilient wall base.

1.3 SUBMITTALS

A. Product Data: For each type of product specified.

B. Samples for Initial Selection: Manufacturer's standard sample sets consisting of sections of units showing the full range of colors and patterns available for each type of product indicated.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.

B. Source Limitations: Obtain each type and color of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

C. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Critical Radiant Flux: 0.45 W/sq. cm or greater when tested per ASTM E 648.
2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E 662.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F (10 and 32 deg C).

C. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

1.6 PROJECT CONDITIONS

A. Maintain a temperature of not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C) in spaces to receive resilient products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After postinstallation period, maintain a temperature of not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

B. Do not install products until they are at the same temperature as the space where they are to be installed.

C. For resilient products installed on traffic surfaces, close spaces to traffic during installation and for time period after installation recommended in writing by manufacturer.

D. Coordinate resilient product installation with other construction to minimize possibility of damage and soiling during remainder of construction period. Install resilient products after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

1. Furnish not less than 10 linear feet (3 linear m) for each 500 linear feet (150 linear m) or fraction thereof, of each different type, color, pattern, and size of resilient product installed.
2. Deliver extra materials to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated in the Resilient Wall Base and Accessory Schedule at the end of Part 3.

B. Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Resilient Wall Base and Accessory Schedule at the end of Part 3.

2.2 RESILIENT WALL BASE

A. Rubber Wall Base: Products complying with resilient wall base and accessories section 3.5 of this specification section.

2.3 RESILIENT ACCESSORIES

A. Rubber Accessories: Products complying with requirements specified in the Resilient Wall Base and Accessory Schedule.

2.4 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by resilient product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with manufacturer's requirements, including those for maximum moisture content. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

D. Broom and vacuum clean substrates to be covered immediately before installing resilient products. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. General: Install resilient products according to manufacturer's written installation instructions.

B. Apply resilient wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

1. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

2. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
3. Do not stretch base during installation.
4. Form outside corners on job, from straight pieces of maximum lengths possible, without whitening at bends. Shave back of base at points where bends occur and remove strips perpendicular to length of base that are only deep enough to produce a snug fit without removing more than half the wall base thickness.
5. Form inside corners on job, from straight pieces of maximum lengths possible, by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce a snug fit to substrate.

C. Place resilient products so they are butted to adjacent materials and bond to substrates with adhesive. Install reducer strips at edges of flooring that would otherwise be exposed.

3.4 CLEANING AND PROTECTING

A. Perform the following operations immediately after installing resilient products:

1. Remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.
2. Sweep or vacuum horizontal surfaces thoroughly.
3. Do not wash resilient products until after time period recommended by resilient product manufacturer.
4. Damp-mop or sponge resilient products to remove marks and soil.

B. Protect resilient products against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by resilient product manufacturer.

1. Apply protective floor polish to vinyl resilient products installed on floors and stairs that are free from soil, visible adhesive, and surface blemishes, if recommended by manufacturer.

   a. Use commercially available product acceptable to resilient product manufacturer.
   b. Coordinate selection of floor polish with Owner's maintenance service.

2. Cover resilient products installed on floors and stairs with undyed, untreated building paper until inspection for Substantial Completion.

C. Clean resilient products not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products according to manufacturer's written recommendations.

1. Before cleaning, strip protective floor polish that was applied to vinyl products on floors and stairs after completing installation only if required to restore polish finish and if recommended by resilient product manufacturer.
2. After cleaning, reapply polish on vinyl products on floors to restore protective floor finish according to resilient product manufacturer's written recommendations. Coordinate with Owner's maintenance program.

3.5 RESILIENT WALL BASE AND ACCESSORY SCHEDULE

A. Rubber Wall Base: Where designated, provide rubber wall base complying with the following:

1. Color and Pattern: Roppe 700 series or equal,
2. Style: 6" Coved at all locations.
3. Thickness: 1/8"

END OF SECTION 09653

SECTION 09770 - SPECIAL WALL SURFACES (Fiberglass Reinforced Plastic Panels)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Special wall surfaces, including fiberglass reinforced plastic panels.

B. Related Sections: Section related to this section include:

1. Division Gypsum board assemblies Section 09255.

1.2 SYSTEM DESCRIPTION

A. Performance Requirements: Provide fiberglass reinforced plastic (FRP) panels which have been manufactured and installed to maintain performance criteria stated by manufacturer without defects, damage, or failure.

1.3 SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.

B. Product Data: Submit product data, including manufacturer's SPEC-DATA product sheet, for specified products.

C. Samples: Submit selection and verification samples for finishes, colors and textures. Submit two samples of each type of panel, trim and fastener.

D. Quality Assurance Submittals: Submit the following:

1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
2. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics, criteria and physical requirements.

E. Closeout Submittals: Submit the following:
1. Warranty: Warranty documents specified herein.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications: Installer should be experienced in performing work of this section and should have specialized in installation of work similar to that required for this project.

a. Certificate: When requested, submit certificate indicating qualifications.

2. Manufacturer Qualifications: Manufacturer should be capable of providing field service representation during construction and should be capable of approving application method.Specifier

1.5 DELIVERY, STORAGE, & HANDLING

A. General: Comply with Division 1 Product Requirements Sections.

B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Package sheets on skids or pallets for shipment to project site.

D. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer. Store panels indoors in a dry place at the project site.

E. Handling: Remove foreign matter from face of panel by use of a soft bristle brush, avoiding abrasive action.

1.6 PROJECT CONDITIONS

A. Environmental Requirements:

1. Installation shall not begin until building is enclosed, permanent heating and cooling equipment is in operation, and residual moisture from plaster, concrete or terrazzo work has dissipated.
2. During installation, and for not less than 48 hours before, maintain an ambient temperature and relative humidity within limits required by type of adhesive used and recommendation of adhesive manufacturer.
3. Provide ventilation to disperse fumes during application of adhesive as recommended by adhesive manufacturer.

B. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.7 WARRANTY

A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

B. 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.

1. Warranty Period: 10 years commencing on Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FIBERGLASS REINFORCED PLASTIC (FRP) PANELS

A. Manufacturer: Kemlite Company or equal.

1. Contact: P.O. Box 2429, Joilet, IL 60434; Telephone: (800) 435-0080, (815) 467-8600; Fax: (815) 467-8666.

2. F.R.P:

   a. Color: from manufacturers full line of colors.
   b. Size: 4' x 8',.
   c. Moldings: Provide harmonizing PVC (polyvinyl chloride) moldings.

3. Surfaseal Surface Protection: Provide manufacturer's proprietary surfaseal surface protection for fiberglass reinforced plastic (FRP) panels.
4. Division Bars, Corner Trim: Panel manufacturer's standard length extruded vinyl pieces; longest length possible to eliminate end joints.
5. Fasteners: Noncorrosive drive rivets.

2.2 MANUFACTURED UNITS

A. Kemlite Glasbord-P Fiberglass Panels with Surfaseal Surface Protection:

1. Rating: Class III (C) Interior Finish.
2. Wall Panels: Finish, thickness and color shall be:

   a. Embossed 0.09" (2.3 mm) Glasbord-P with Surfaseal color: 85 white, 83 colonial white, 70 soft beige, 48 pearl gray, 66 silver, 84 ivory.

3. Performance Properties: Provide products with the following properties:

   a. Class C Flamespread of 200 or less, Smoke Developed of 450 or lower per ASTM E84 latest version.
   b. Barcol Hardness (scratch resistance) per ASTM D2583 of:

      1) 42 for embossed 0.09" (2.3 mm) Glasbord-P.

   c. Panels shall exhibit no more than a 0.038percent weight loss after a 25-cycle Taber Abrasion Test using CS-17 abrasive wheels with 1000 g weight.
   d. Meets USDA/FSIS Requirements.
   e. Complies with ICBO Report Number 4583.
   f. A means of frontside identification and confirmation of meeting Class III (C) the interior finish requirement after installation and while in service (without labels) embossed panels only.

2.3 ACCESSORIES

A. Adhesive: Provide panel adhesive as recommended by panel manufacturer.

2.4 RELATED MATERIALS

A. Related Materials: Refer to other sections listed in Related Sections paragraph herein for related materials.

2.5 SOURCE QUALITY

A. Source Quality: Obtain fiberglass reinforced plastic (FRP) panels from a single manufacturer. Provide panels and molding only from manufacturer specified to ensure warranty and color harmonization of accessories.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions for installation.

3.2 EXAMINATION

A. Site Verification of Conditions: Verify that substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions.

1. Examine backup surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean, free from foreign matter, nails countersunk, joints and cracks filled flush and smooth with the adjoining surface.
2. Do not begin installation until backup surfaces are in a satisfactory condition.

3.3 PREPARATION

A. Surface Preparation: prepair gypsum dry wall as per manufactures requirements for installation

3.4 INSTALLATION

A. Fiberglass Reinforced Panel (FRP) Installation:

1. Cut and drill panels with carbide tipped saw blades or drill bits, or cut with snips.
2. Install panels with manufacturer's recommended gap for panel field and comer joints.
3. Predrill fastener holes in panels with 1/8" (3.2 mm) oversize.
4. For trowel type and application of adhesive, follow adhesive manufacturer's recommendations.
5. Using products acceptable to panel manufacturer, install FRP system in accordance with panel manufacturer's printed instructions. Comply with panel manufacturer's Installation Guide #6211.

B. Site Tolerances: 1/16".

C. Related Products Installation: Refer to other sections listed in Related Sections paragraph herein for related materials installation.

3.5 FIELD QUALITY REQUIREMENTS

A. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.6 CLEANING

A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace products that have been installed and are damaged. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

1. Remove any adhesive or excessive sealant from panel face using solvent or cleaner recommended by panel manufacturer.

3.7 PROTECTION

A. Protection: Protect installed product and finish surfaces from damage during construction.

END OF SECTION 09770

SECTION 09900 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes surface preparation and field painting of the following:

1. Exposed exterior items and surfaces.
2. Exposed interior items and surfaces.
3. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.

1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.

C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

1. Prefinished items include the following factory-finished components:

a. Architectural woodwork and casework.
b. Metal lockers.
c. Finished mechanical and electrical equipment.
d. Light fixtures.
e. Distribution cabinets.

2. Finished metal surfaces include the following:

a. Anodized aluminum.
b. Stainless steel.
c. Chromium plate.
d. Copper.
e. Bronze and brass.

3. Operating parts include moving parts of operating equipment and the following:

a. Valve and damper operators.
b. Linkages.

c. Sensing devices.
d. Motor and fan shafts.

4. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

D. Related Sections include the following:

1. Division 6 Section "Interior Architectural Woodwork" for shop priming interior architectural woodwork.
2. Division 8 Section "Steel Doors and Frames" for shop priming steel doors and frames.
3. Division 8 Section "Wood Windows" for shop priming unclad wood windows.
4. Division 9 Section "Gypsum Board Assemblies" for surface preparation for gypsum board.

E. Alternates: Refer to Division 1 Section "Alternates" for description of Work in this Section affected by alternates.

1.3 SUBMITTALS

A. Product Data: For each paint system specified. Include block fillers and primers.

1. Material List: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.
3. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated.

1. After color selection, the Architect will furnish color chips for surfaces to be coated.

C. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.

B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:

1. Product name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.
8. VOC content.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.6 PROJECT CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg F (10 and 32 deg C).

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 deg F (7.2 and 35 deg C).

C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.7 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to the Owner.

1. Quantity: Furnish the Owner with extra paint materials in the quantities indicated below:

a. Interior, Semigloss Acrylic Enamel: 1gal. (7.57 L) of each color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in the paint schedules.

B. Products: Subject to compliance with requirements, provide one of the products in the paint schedules.

C. Manufacturers Names: The following manufacturers are referred to in the paint schedules by use of shortened versions of their names, which are shown in parentheses:

1. Devoe & Raynolds Co. (Devoe).
2. Fuller-O'Brien Paints (Fuller).
3. Glidden Co. (The) (Glidden).
4. Benjamin Moore & Co. (Moore).
5. PPG Industries, Inc. (PPG).
6. Pratt & Lambert, Inc. (P & L).
7. Sherwin-Williams Co. (S-W).

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

C. Colors: Match colors indicated by reference to manufacturer's color designations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.

1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.

1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.

2. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.

a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.
c. When transparent finish is required, backprime with spar varnish.
d. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.

3. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.

a. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
b. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.

4. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

D. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.

2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
3. Use only thinners approved by paint manufacturer and only within recommended limits.

E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes are indicated in the schedules.
2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
3. Provide finish coats that are compatible with primers used.
4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned-tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
6. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
7. Sand lightly between each succeeding enamel or varnish coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
2. Omit primer on metal surfaces that have been shop primed and touchup painted.
3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.

3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

E. Mechanical and Electrical Work: do not paint mechanical or electrical items

F. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.

G. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.

1. Provide satin finish for final coats.

H. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.5 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.

1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.6 EXTERIOR PAINT SCHEDULE

A. Exterior Gypsum Soffit Board: Provide the following finish systems over exterior gypsum soffit board:

1. Low-Luster Acrylic Finish: 2 finish coats over a primer.

a. Primer: Exterior, alkyd- or alkali-resistant, acrylic-latex primer, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils (0.038 mm).

1) Devoe: 1102 All-Weather Exterior Alkyd House Paint Primer.
2) Fuller: 220-17 Acrylic Concrete and Masonry Primer Sealer.
3) Glidden: Primer not required over this substrate.
4) Moore: Moore's Latex Exterior Primer #102.
5) PPG: 6-603 Speedhide Interior/Exterior Acrylic Latex Alkali Resistant Primer.
6) P & L: S/D 1008 Suprime "8" Exterior Alkyd Wood Primer.

b. First and Second Coats: Low-luster (eggshell or satin), exterior, acrylic-latex paint applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.3 mils (0.058 mm).

1) Devoe: 16XX Wonder-Shield Exterior Acrylic Latex Satin House and Trim Paint.
2) Fuller: 261-XX Eggshell Sheen Latex House and Trim Paint.
3) Glidden: 6700 Series Spred Ultra Exterior Satin Latex House and Trim Paint.
4) Moore: MoorGard Latex House Paint #103.
5) PPG: 76 Line Sun-Proof Exterior House & Trim Acrylic Satin Latex.
6) P & L: Z/F 1800 Series Aqua-Shell Exterior Latex Eggshell Paint.
7) S-W: DTM Acrylic Coating Gloss (Waterborne) B66W100 Series

B. Ferrous Metal: Provide the following finish systems over exterior ferrous metal. Primer is not required on shop-primed items.

1. Low-Luster Acrylic Finish: 2 finish coats over a rust-inhibitive primer.

a. Primer: Rust-inhibitive metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils (0.033 mm).

1) Devoe: 13101 Mirrolac Rust Penetrating Metal Primer.
2) Fuller: 621-04 Blox-Rust Alkyd Metal Primer.
3) Glidden: 5205 Glid-Guard Tank & Structural Primer, Red.
4) Moore: IronClad Retardo Rust-Inhibitive Paint #163.
5) PPG: 6-208 Speedhide Interior/Exterior Rust Inhibitive Steel Primer, Red.
6) P & L: S/D 1009 Suprime "9" Interior/Exterior Alkyd Metal Primer.

b. First and Second Coat: Low-sheen (eggshell or satin), exterior, acrylic-latex paint applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.8 mils (0.071 mm).

1) Devoe: 16XX Wonder-Shield Exterior Latex Satin House and Trim Paint.
2) Fuller: 261-XX Eggshell Sheen Latex House and Trim Paint.
3) Glidden: 6700 Series Spred Ultra Exterior Satin Latex House and Trim Paint.
4) Moore: MoorGard Latex House Paint #103.
5) PPG: 76 Line Sun-Proof Exterior House & Trim Acrylic Satin Latex.
6) P & L: Z/F 4200 Series Accolade Exterior Eggshell.
7) W: DTM Acrylic Coating Gloss (Waterborne) B66W100 Series.

C. Zinc-Coated Metal: Provide the following finish systems over exterior zinc-coated (galvanized) metal surfaces:

1. Low-Luster Finish: 2 finish coats over a galvanized metal primer.

a. Primer: Galvanized metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils (0.031 mm).

1) Devoe: 8502/8520 Mirrolac Interior/Exterior Waterborne Flat DTM Primer and Finish.
2) Fuller: 621-05 Blox-Rust Latex Metal Primer.
3) Glidden: 5205 Glid-Guard Tank & Structural Primer, Red.
4) Moore: IronClad Galvanized Metal Latex Primer #155.
5) PPG: 90-709 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel.
6) P & L: Z/F 1003 Suprime "3" Interior/Exterior Latex Metal Primer.

b. First and Second Coat: Low-luster (eggshell of satin), exterior, acrylic-latex paint applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.8 mils (0.071 mm).

1) Devoe: 16XX Wonder-Shield Exterior Acrylic Latex Satin House and Trim Paint.
2) Fuller: 261-XX Eggshell Sheen Latex House and Trim Paint.
3) Glidden: 6700 Series Spred Ultra Exterior Satin Latex House and Trim Paint.
4) Moore: MoorGard Latex House Paint #103.
5) PPG: 76 Line Sun-Proof Exterior House & Trim Acrylic Satin Latex.
6) P & L: Z/F 4200 Series Accolade Exterior Eggshell.

3.7 INTERIOR PAINT SCHEDULE

A. Concrete Floor Sealer:

1) "Moxie 1500" concrete floor sealer

B. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces:

1. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a primer.

a. Primer: Latex-based, interior primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils (0.031 mm).

1) Devoe: 50801 Wonder-Tones Interior Vinyl Latex Primer-Sealer.
2) Fuller: 220-20 Pro-Tech Latex Wall Primer Sealer, White.
3) Glidden: 5111 Spred Ultra Latex Primer-Sealer.
4) Moore: Regal First Coat Interior Latex Primer & Underbody #216.
5) PPG: 17-10 Quick-Drying Interior Latex Primer-Sealer.
6) P & L: Z/F 1001 Suprime "1" 100 Percent Acrylic Multi-Purpose Primer.

b. First and Second Coats: Semigloss, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.6 mils (0.066 mm).

1) Devoe: 39XX Wonder-Tones Semi-Gloss Interior Latex Enamel.
2) Fuller: 214-XX AA Enamel Interior Acrylic Latex Semi-Gloss Enamel.
3) Glidden: 8200 Series Spred Ultra Latex Semi-Gloss Enamel.
4) Moore: Moore's Regal AquaGlo Vinyl-Acrylic Latex Enamel #333.
5) PPG: 88-110 Satinhide Interior Enamel Wall & Trim Lo-Lustre Semi-Gloss Latex.
6) P & L: Z/F 4100 Series Accolade Interior Semi-Gloss.

C. Ferrous Metal: Provide the following finish systems over ferrous metal:

1. Semigloss, Acrylic-Enamel Finish: One finish coat over an enamel undercoater and a primer.

a. Primer: Quick-drying, rust-inhibitive, alkyd-based or epoxy-metal primer, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils (0.038 mm).

1) Devoe: 13101 Mirrolac Rust Penetrating Metal Primer.
2) Fuller: 621-04 Blox-Rust Alkyd & Structural Metal Primer.
3) Glidden: 5207 Glid-Guard Tank & Structural Primer, White.
4) Moore: IronClad Retardo Rust-Inhibitive Paint #163.
5) PPG: 6-208 Speedhide Interior/Exterior Rust Inhibitive Steel Primer.
6) P & L: S 4551 Tech-Gard High Performance Rust Inhibitor Primer.

b. Undercoat: Alkyd, interior enamel undercoat or semigloss, acrylic-latex, interior enamel, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils (0.033 mm).

1) Devoe: 39XX Wonder-Tones Semi-Gloss Interior Latex Enamel.
2) Fuller: 220-07 Interior Alkyd Enamel Undercoat.
3) Glidden: 8200 Series Spred Ultra Latex Semi-Gloss Enamel.
4) Moore: Moore's Alkyd Enamel Underbody #217.
5) PPG: 6-6 Speedhide Interior Quick-Drying Enamel Undercoater.
6) P & L: Z/F 4100 Series Accolade Interior Semi-Gloss.

c. Finish Coat: Semigloss, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils (0.033 mm).

1) Devoe: 39XX Wonder-Tones Semi-Gloss Interior Latex Enamel.
2) Fuller: 214-XX AA Enamel Interior Acrylic Latex Semi-Gloss Enamel.
3) Glidden: 8200 Series Spred Ultra Latex Semi-Gloss Enamel.
4) Moore: Moore's Regal AquaGlo Vinyl-Acrylic Latex Enamel #333.
5) PPG: 88-110 Satinhide Interior Enamel Wall & Trim Lo-Lustre Semi-Gloss Latex.
6) P & L: Z/F 4100 Series Accolade Interior Semi-Gloss.

D. Zinc-Coated Metal: Provide the following finish systems over zinc-coated metal:

1. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a primer.

a. Primer: Galvanized metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils (0.031 mm).

1) Devoe: 13201 Mirrolac Galvanized Metal Primer.
2) Fuller: 621-05 Blox-Rust Latex Metal Primer.
3) Glidden: 5207 Glid-Guard Tank & Structural Primer, White.
4) Moore: IronClad Galvanized Metal Latex Primer #155.
5) PPG: 90-709 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel.
6) P & L: Z/F 1003 Suprime "3" Interior/Exterior Latex Metal Primer.

b. First and Second Coats: Semigloss, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.6 mils (0.066 mm).

1) Devoe: 39XX Wonder-Tones Semi-Gloss Interior Latex Enamel.
2) Fuller: 214-XX AA Enamel Interior Acrylic Latex Semi-Gloss Enamel.
3) Glidden: 8200 Series Spred Ultra Latex Semi-Gloss Enamel.
4) Moore: Moore's Regal AquaGlo Vinyl-Acrylic Latex Enamel #333.
5) PPG: 88-110 Satinhide Interior Enamel Wall & Trim Lo-Lustre Semi-Gloss Latex.
6) P & L: Z/F 4100 Series Accolade Interior Semi-Gloss.

END OF SECTION 09900

SECTION 10155 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes toilet compartments and screens as follows:

1. Type: Solid-plastic, high density polyethylene
2. Compartment Style: Overhead braced and floor anchored.
3. Screen Style: Wall hung.

B. Related Sections include the following:

1. Division 10 "Toilet and Bath Accessories" for toilet paper holders, grab bars, purse shelves, and similar accessories.

1.3 SUBMITTALS

A. Product Data: For each type and style of toilet compartment and screen specified. Include details of construction relative to materials, fabrication, and installation. Include details of anchors, hardware, and fastenings.

B. Shop Drawings: For fabrication and installation of toilet compartment and screen assemblies. Include plans, elevations, sections, details, and attachments to other work.

1. Show locations of reinforcement and cutouts for compartment-mounted toilet accessories.

C. Samples for Verification: Of each compartment or screen color and finish required, prepared on 6-inch- (150-mm-) square Samples of same thickness and material indicated for Work.

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions in areas of installation by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating units without field

measurements. Coordinate supports, adjacent construction, and fixture locations to ensure actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Accurate Partitions Corporation.
2. All American Metal Corp.
3. Ampco Products, Inc.
4. Commercial and Architectural Products, Inc.; Marlite.
5. Compression Polymers Group; Comtec Industries.
6. Crane Plumbing; Sanymetal.
7. Knickerbocker Partition Corporation.
8. Lambaton/Universal.
9. MASCO; Flush-Metal Partition Corp.
10. Metpar Corp.
11. Mills Company (The).
12. Partition Systems, Inc.; Columbia Partitions.
13. Santana Products, Inc.

2.2 MATERIALS

A. General: Provide materials that have been selected for surface flatness and smoothness. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections on finished units are unacceptable.

B. Solid-Plastic, Polymer Resin: High-density polyethylene (HDPE) with homogenous color throughout. Provide material not less than 1 inch (25 mm) thick with seamless construction and eased edges in color and pattern as follows:

1. Color and Pattern: One color and pattern in each room as selected by Architect from manufacturer's full range of colors and patterns.

C. Pilaster Shoes and Sleeves (Caps): ASTM A 666, Type 302 or 304 stainless steel, not less than 0.0312 inch (0.8 mm) thick and 3 inches (75 mm) high, finished to match hardware.

D. Stirrup Brackets: Manufacturer's standard ear or U-brackets for attaching panels and screens to walls and pilasters of the following material:

1. Material: Chrome-plated, nonferrous, cast zinc alloy (zamac) or clear-anodized aluminum.

E. Full-Height (Continuous) Brackets: Manufacturer's standard design for attaching panels and screens to walls and pilasters of the following material:

1. Material: Clear-anodized aluminum.

F. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories of the following material:

1. Material: Stainless steel.

G. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile in manufacturer's standard finish.

H. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum strip in manufacturer's standard finish.

I. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel.

2.3 FABRICATION

A. General: Provide standard doors, panels, screens, and pilasters fabricated for compartment system. Provide units with cutouts and drilled holes to receive compartment-mounted hardware, accessories, and grab bars, as indicated.

B. Solid-Plastic, Polymer-Resin Compartments and Screens: Provide aluminum heat-sink strips at exposed bottom edges of HDPE units to prevent burning.

C. Overhead-Braced-and-Floor-Anchored Compartments: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions. Make provisions for setting and securing continuous head rail at top of each pilaster. Provide shoes at pilasters to conceal supports and leveling mechanism.

D. Floor-Anchored Compartments: Provide manufacturer's standard corrosion-resistant anchoring assemblies complete with threaded rods, lock washers, and leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.

E. Wall-Hung Screens: Provide units in sizes indicated of same construction and finish as compartment panels, unless otherwise indicated.

F. Doors: Unless otherwise indicated, provide 24-inch- (610-mm-) wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide out-swinging doors with a

minimum 32-inch- (813-mm-) wide clear opening for compartments indicated to be handicapped accessible.

1. Hinges: Manufacturer's standard self-closing type that can be adjusted to hold door open at any angle up to 90 degrees.
2. Latch and Keeper: Recessed latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be handicapped accessible.
3. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
4. Door Bumper: Manufacturer's standard rubber-tipped bumpers at out-swinging doors or entrance screen doors.
5. Door Pull: Manufacturer's standard unit that complies with accessibility requirements of authorities having jurisdiction at out-swinging doors. Provide units on both sides of doors at compartments indicated to be handicapped accessible.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, plumb, and level. Provide clearances of not more than 1/2 inch (13 mm) between pilasters and panels and not more than 1 inch (25 mm) between panels and walls. Secure units in position with manufacturer's recommended anchoring devices.

1. Secure panels to walls and panels with not less than 2 stirrup brackets attached near top and bottom of panel. Locate wall brackets so holes for wall anchors occur in masonry or tile joints. Align brackets at pilasters with brackets at walls.

B. Overhead-Braced-and-Floor-Anchored Compartments: Secure pilasters to floor and level, plumb, and tighten. Secure continuous head rail to each pilaster with not less than 2 fasteners. Hang doors and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

C. Screens: Attach with anchoring devices according to manufacturer's written instructions and to suit supporting structure. Set units level and plumb and to resist lateral impact.

3.2 ADJUSTING AND CLEANING

A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and swing doors in entrance screens to return to fully closed position.

B. Provide final protection and maintain conditions that ensure toilet compartments and screens are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 10155

SECTION 10425 - SIGNS

1.1 GENERAL

A. Submittals: Submit the following:
   1. Samples: For initial selection of color, pattern, and surface texture, and for verification of compliance with requirements indicated.

      a. Cast Acrylic Sheet and Plastic Laminate: 8-1/2-by-11-inch sample panel for each material, color, texture, and pattern. Show graphic image process showing style, colors and finishes.

1.2 PRODUCTS

A. ABS Plastic: Provide high-impact thermoplastic composed of copolymers of acrylonitrile, butadiene, and styrene.

B. Graphic Content and Style: Provide sign copy that complies with size, style, spacing, content, position, material, finishes, and colors of letters, numbers, and other graphic devices.

1.3 EXECUTION

A. Installation: Locate signs where indicated, using mounting methods specified. Install level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.

B. Wall-Mounted Panel Signs: Attach using methods indicated below:

   1. Vinyl-Tape Mounting: Double-sided foam tape for smooth, nonporous surfaces.
   2. Silicone-Adhesive Mounting: Liquid silicone adhesive for porous, irregular, or vinyl-covered surfaces. Use double-sided vinyl tape to hold sign in place until adhesive has fully cured.

C. Cleaning: After installation, clean soiled surfaces. Protect units from damage until acceptance by the Owner.

END OF SECTION 10425

SECTION 10520 - FIRE-PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Portable fire extinguishers.

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection specialties.

1. Fire Extinguishers: Include rating and classification.

B. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of cabinet finish indicated.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain fire extinguishers and cabinets through one source from a single manufacturer.

B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."

C. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

1. Provide extinguishers listed and labeled by FM.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Portable Fire Extinguishers:

   a. Amerex Corporation.
   b. J.L. Industries, Inc.
   c. Kidde: Walter Kidde, The Fire Extinguisher Co.
   d. Larsen's Manufacturing Company.
   e. Modern Metal Products; Div. of Technico.
   f. Moon/American, Inc.
   g. Pem All; Div. of Pem Systems, Inc.
   h. Potter-Roemer; Div. of Smith Industries, Inc.
   i. Watrous; Div. of American Specialties, Inc.

2.2 PORTABLE FIRE EXTINGUISHERS

A. General: Provide fire extinguishers of type, size, and capacity for locations indicated.

B. Multipurpose Dry-Chemical Type: UL-rated 4-A:60-B:C, 10-lb (4.5-kg) nominal capacity, in enameled-steel container.

2.3 ACCESSORIES

A. Mounting Brackets: Manufacturer's standard steel, designed to secure extinguisher, of sizes required for types and capacities of extinguishers indicated, with plated or baked-enamel finish.

   1. Provide brackets for extinguishers not located in cabinets.

B. Identification: Provide signage to comply with authorities having jurisdiction for letter style, color, size, spacing, and location. Locate as indicated by Architect.
   1. Identify fire extinguisher with the words "FIRE EXTINGUISHER".

      a. Lettering Color: Red.

2.4 COLORS AND TEXTURES

A. Colors and Textures: As selected by Architect from manufacturer's full range for these characteristics.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

   1. Remove and replace damaged, defective, or undercharged units.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing fire-protection specialties.

B. Install in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

1. Fasten mounting brackets to structure, square and plumb.

END OF SECTION 10520

SECTION 10801 - TOILET AND BATH ACCESSORIES

GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes the following:

Toilet and bath accessories.

SUBMITTALS

Product Data: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.

Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required. Use designations indicated in the Toilet and Bath Accessory Schedule and room designations indicated on Drawings in product schedule.

Maintenance Data: For accessories to include in maintenance manuals specified in Division 1. Provide lists of replacement parts and service recommendations.

QUALITY ASSURANCE

Source Limitations: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise approved by Architect.

COORDINATION

Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories.

WARRANTY

General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

Manufacturer's Mirror Warranty: Written warranty, executed by mirror manufacturer agreeing to replace mirrors that develop visible silver spoilage defects within minimum warranty period indicated.

Minimum Warranty Period: 15 years from date of Substantial Completion.

PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering accessories that may be incorporated into the Work include, but are not limited to, the following:

Manufacturers: Subject to compliance with requirements, provide accessories by one of the following:

Toilet and Bath Accessories: See specified accessories alternate must meet specified quality and construction. Pre-approval by architect prior to bidding.

A & J Washroom Accessories, Inc.
American Specialties, Inc.
Bobrick Washroom Equipment, Inc.
Bradley Corporation.
McKinney/Parker Washroom Accessories Corp.

Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated in the Toilet and Bath Accessory Schedule at the end of Part 3.

Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Toilet and Bath Accessory Schedule at the end of Part 3.

MATERIALS

Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch (0.8-mm) minimum nominal thickness, unless otherwise indicated.

Mirror Glass: ASTM C 1036, Type I, Class 1, Quality q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.

Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

FABRICATION

General: One, maximum 1-1/2-inch- (38-mm-) diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of accessories. On interior surface not exposed to view or back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.

Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.

Framed Glass-Mirror Units: Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.

Provide galvanized steel backing sheet, not less than 0.034 inch (0.85 mm) and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.

Mirror-Unit Hangers: Provide mirror-unit mounting system that permits rigid, tamper- and theft-resistant installation, as follows:

Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

EXECUTION

INSTALLATION

Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated. Provide blocking in walls as needed for sufficient installation Toilet and Bath accessories.

Secure mirrors to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.

Install grab bars to withstand a downward load of at least 250 lbf (1112 N), when tested according to method in ASTM F 446.

ADJUSTING AND CLEANING

Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.

Remove temporary labels and protective coatings.

Clean and polish exposed surfaces according to manufacturers written recommendations.

TOILET AND BATH ACCESSORY SCHEDULE

1. Waste Receptacle, Bobrick B-277 waste receptacle, stainless steel satin finish, or pre-approved equal by others.
2. Grab Bar, Bobrick B-5806 or approved equal, stainless steel grab bar with snap flange 1 @ 36" long , 1 at 30" long and one at 18" long . 1 per each handicap stall or per approved equal by others.
3. Utility Shelf With Broom Holders and Rag Hooks, Bobrick B-224 or approved equal by others.

Mirror Unit, provide mirror unit complying with the following:

Stainless-Steel, Channel-Framed Mirror: Fabricate frame from stainless-steel channels in manufacturer's standard satin or bright finish with square corners mitered to hairline joints and mechanically interlocked.

END OF SECTION 10801

SECTION 15100 - MECHANICAL REQUIREMENTS

GENERAL CONDITIONS:

The General Conditions of the Contract, with the amendments, supplements, forms and requirements in Division 1, and herewith made a part of this Division.

All sections of Division 15 shall comply with the Mechanical General Requirements. The standards established in this section as to quality of materials and equipment, the type and quality of workmanship, mode of operations, safety rules, code requirements, etc., shall apply to all sections of this Division as though they were repeated in each Division.

SCOPE OF WORK:

The project described herein is Dead Horse Point Restrooms. This work shall include all labor, materials, equipment, fixtures, and devices for the entire mechanical work and a complete operating and tested installation as required for this project.

Section 15100	Mechanical General Requirements
Section 15150	Balancing, Maintenance Manuals, and Identification
Section 15200	Insulation
Section 15250	Seismic and Vibration Control
Section 15300	Piping Systems (Specialties and Valves)
Section 15400	Plumbing Systems
Section 15800	Air Distribution, Heating and Air-Conditioning
Section 15900	Automatic Temperature Control System

CODES & ORDINANCES:

All work shall be executed in accordance with all underwriters, public utilities, local and state rules and regulations applicable to the trade affected. Should any change in the plans and Specifications be required to comply with these regulations, the Contractor shall notify the Architect before the time of submitting his bid. After entering into contract, the Contractor will be held to complete all work necessary to meet these requirements without extra expense to the Owner. Where work required by drawings or specifications is above the standard required, it shall be done as shown or specified.
Applicable codes are as follows:

2006	International Mechanical Code
2006	International Building Code
2006	International Plumbing Code

UTILITIES & FEES:

Contractor is responsible to obtain all permits and fee information for this project.

All charges for fees and permits will be paid by the owner. Unless noted otherwise, all systems furnished and or installed by this Contractor, shall be complete with all utilities, components, commodities and accessories required for a fully functioning system.

SUBMITTALS AND SHOP DRAWINGS:

Submittals:

As soon as possible after the contract is awarded, but in no case more than 45 calendar days thereafter, the Contractor shall submit to the Architect six (6) copies of the descriptive literature covering products and materials to be used in the installation of mechanical systems for this project. The review of the submitted data will require a minimum of 21 days. If the Contractors schedule requires return of submitted literature in less than the allotted time, the Contractor shall accelerate his submittal delivery date. The Contractor shall resubmit all items requiring re-review within 21 days of returned submittals. Refer to each specification section for items requiring submittal review. Written approval of the Owner's Representative shall be obtained before installing any such equipment or materials for the project. The submittals shall be prepared in an orderly manner, contained in a 3-ring loose-leaf binder with index and identification tabs each item or group of items and for each specification section. All items shall be submitted at one time except automatic temperature control drawings and seismic restraint drawings which may be submitted separately within 120 days of the contract award date. Partial submittals will not be reviewed until the complete submittal is received.

Submitted literature shall bear the Contractor's stamp, indicating that he has checked all equipment being submitted; that each item will fit into the available space with the accesses shown on the drawings; and, further, that each item conforms to the capacity and quality standards given in the contract documents.

Submitted literature shall clearly indicate performance, quality, and utility requirements; shall show dimension and size of connection points; and shall include derating factors that were applied for each item of equipment to provide capacity at job site elevation. Temperature control submittals shall include piping and wiring diagrams, sequence of operation and equipment. Equipment must fit into the available space with allowance for operation, maintenance, etc. Factory piped and wired equipment shall include shop drawings for all internal wiring and piping furnished with the unit.

Submitted literature shall clearly show all required field install wiring, piping, and accessory installations required by the Contractor to provide a complete operating system.

Review by the Owner's Representative is for general conformance of the submitted equipment to the project specification. In no way does such review relieve this Contractor of his obligation to furnish equipment and materials that comply in detail to the specification nor does it relieve the Contractor of his obligation to determine actual field dimensions and conditions that may affect his work. Regardless of any items overlooked by the submittal review, the requirements of the contract drawings and specifications must be followed and are not waived or superseded in any way by the review.
By description, catalog number, and manufacturer's names, standards of quality have been established by the Architect and the Engineer for certain manufactured equipment items and specialties that are to be furnished by this Division. Alternate products and equipment may be proposed for use only if specifically named in the specifications or if given written prior approval in published addenda. Design equipment is the equipment listed on the drawings or if not listed on the drawings is the equipment first named in the specifications.

Alternate Equipment:

The Contractor should protect himself with the supplier of alternate named equipment. Alternate named equipment will be reviewed only one time.

Should alternate equipment be submitted and be rejected, it shall not be resubmitted for review and it shall be the responsibility of this contractor. The contractor shall only submit on design equipment on future submittals. Incomplete submittal data will be rejected.

If the Engineer is required to do additional design work to incorporate changes caused by submitting equipment or products, different than the design equipment specified, as defined above, the contractor shall reimburse the engineer for additional time and expenses at the engineers current, recognized, hourly rates.

DRAWINGS AND MEASUREMENTS:

Drawings:

The contract document drawings show the general design, arrangements, and extent of the system. In certain cases, the drawings may include details that show more nearly exact locations and arrangements; however, the locations, as shown diagrammatically, are to be regarded as general.

It shall be the work of this Section to make such slight alterations as may be necessary to make adjustable parts fit to fixed parts, leaving all complete and in proper shape when done. All dimensions given on the drawings shall be verified as related to this work and with the Architect's office before work is started.

This Section shall carefully study building sections, space, clearances, etc., and then provide offsets in piping or ductwork as required to accommodate the building structure without additional cost to the Owner. In any case and at any time, a change in location required by obstacles or the installation of other trades not shown on the mechanical plans shall be made without charge.

The drawings shall not be scaled for roughing in measurements nor shall they be used as shop drawings. Where drawings are required for these purposes or where drawings must be made from field measurements, the Contractor shall take the necessary measurements and prepare the drawings. Shop drawings of the various subContractors shall be coordinated to eliminate all interferences and to provide sufficient space for the installation of all equipment, piping, ductwork, etc.

The drawings and specifications have been prepared to supplement each other and they shall be interpreted as an integral unit with items shown on one and not the other being furnished and installed as though shown and called out on both.

Record Drawings:

Record drawings for all systems and sections of this Division shall be furnished as work of this Section. Blue-line white prints of floor plans shall be furnished by the Architect's office. These prints shall be accurately and neatly marked in colored pencil, showing all changes from schematics.

These drawings shall be reviewed with the Architect at least once each month, shall be submitted at time of final inspection, and shall be checked for accuracy. Failure to keep record drawings up-to-date shall be cause for withholding monthly payments.

CONTRACTOR'S USE OF BUILDING EQUIPMENT:

The Contractor may use equipment such as electric motors, fans, heat exchangers, filters, etc., with the written permission of the Owner. As each piece of equipment is used (such as electric motors and fans), maintenance procedures approved by the manufacturer are to be followed. A careful record is to be kept of the length of the time the equipment is used, maintenance procedures followed, and any difficulty encountered. The record is to be submitted to the Owner upon acceptance. All fan belts and filter media (such as bearings) shall be carefully inspected just prior to acceptance. Any excessive wear noted shall require replacement.

EQUIPMENT CAPACITIES:

Capacities shown for equipment in the specifications and on the drawings are the minimum acceptable. No equipment shall be considered as an alternate which has capacities or performance less than that of design equipment.

All equipment shall give the specified capacity and performance at the job-site elevation.. Manufacturers' standard ratings shall be adjusted accordingly. All capacities and performances listed on drawings or in specifications are for job-site conditions.

SEISMIC REQUIREMENTS FOR EQUIPMENT:

All equipment must be furnished structurally adequate to withstand seismic forces as outlined in the International Building Code. Equipment bases shall be designed for direct attachment of seismic snubbers and/or seismic anchors.

COOPERATION WITH OTHER TRADES:

The Contractor shall refer to other drawings and parts of this specification that cover work of other trades that is carried on in conjunction with the mechanical work such that all work can proceed without interference resulting from lack of coordination.

The Contractor shall properly size and locate all openings, chases, sleeves, equipment bases, and accesses. He shall provide accurate wiring diagrams to the Electrical Contractor for all equipment furnished under this Division.

The ceiling cavity must be carefully reviewed and coordinated with all trades. In the event of conflict, the installation of the mechanical equipment and piping shall be in the following order: plumbing, waste, and soil lines; supply, return, and exhaust ductwork; water piping; medical gases; fire protection piping; and pneumatic control piping.

The mechanical Contractor shall insure that the installation of all piping, ducts and equipment is in compliance with Articles 110-16 and 384-4 of the National Electrical Code relative to proper clearances in front of and over all electrical panels and equipment. No piping or ductwork will be allowed to run over electrical panel.

RESPONSIBILITY OF CONTRACTOR:

The Contractor is responsible for the installation of a satisfactory piece of work in accordance with the true intent of the drawings and specifications. He shall provide, as a part of his work and without expense, all incidental items required even though these items are not particularly specified or indicated. The installation shall be made so that its several component parts will function together as a workable system and shall be left with all equipment properly adjusted and in working order. The Contractor shall familiarize the Owner's Representative with maintenance and lubrication instructions as prepared by the Contractor and shall explain and fully instruct him relative to operating, servicing, and maintenance of them.

PIPE AND DUCT OPENINGS AND EQUIPMENT RECESSES:

Pipe and duct chases, openings, and equipment recesses shall be provided by others only if shown on architectural or structural drawings. All openings for the mechanical work, except where plans and specifications indicate otherwise, shall be provided as work of this Division.

Whether chases, recesses, and openings are provided as work of this Division or by others, this Contractor shall supervise their construction and be responsible for the correct size and location even though detailed and dimensioned on the drawings. This Contractor shall pay for all necessary cutting, repairing, and finishing if any are left out or incorrectly made. All necessary openings thru existing walls, ceilings, floors, roofs, etc. shall be provided by this Contractor unless indicated otherwise by the drawing and/or specifications.

UNFIT OR DAMAGED WORK:

Any part of this installation that fails, is unfit, or becomes damaged during construction, shall be replaced or otherwise made good. The cost of such remedy shall be the responsibility of this Division.

WORKMANSHIP:

Workmanship shall be the best quality of its kind for the respective industries, trades, crafts, and practices, and shall be acceptable in every respect to the Owner's representative. Nothing contained herein shall relieve the Contractor from making good and perfect work in all details in construction.

SAFETY REGULATION:

The Contractor shall comply with all local and OSHA safety requirements in performance with this work. (See General Conditions). This Contractor shall be required to provide equipment, supervision, construction, procedures, and all other necessary items to assure safety to life and property.

ELECTRICAL SERVICES:

Motors:

All motors required under this Division shall be furnished and installed as work of this Division. All motor-starting equipment, unless otherwise specified in Division 15 shall be furnished as work of Division 16, Electrical. Motors shall be name plated with Class F insulation as manufactured by Lincoln Electric, US Motors, General Electric, Allis Chalmers, Century, or Reliance, designed for quiet continuous operations with maximum (Class B) 90°C resistance heating rise with 40°C ambient temperature at full load and rated speed and voltage individually specified with minimum 1.15 service factor. Motors shall be all of the same make except those incorporated in packaged units. All motors shall be provided with ball bearings and conduit connection boxes. Lifting eyes shall be provided on motors 1-1/2 horsepower and larger.

The Mechanical Contractor shall furnish and set all motors, shall give the exact locations of all electrical connections, and shall provide complete information on motor control to the Electrical Contractor. The Mechanical Contractor shall be responsible for the proper operation of all electrical power equipment furnished by him.

Unless otherwise specified, motors 3/4 horsepower and larger shall be 3 phase, 60 cycle, and motors 1/2 horsepower and smaller shall be single phase, 60 cycle. Refer to fan and equipment schedules on drawings for voltage characteristics, horsepower, size, etc. All single-phase motors shall have thermal overload protection. If motor-starting equipment is included in packaged units, all three phases shall have overload protection. All motors shall have a power factor of 85 percent or better. All motors 20 horsepower and larger shall be manufacturers Premium Efficiency grade and shall meet the NEMA MG 1-12.54" efficiency ratings for energy efficient motors. All two speed motors, unless otherwise specified, shall be 1800/1200 rpm dual winding type. All 3 phase motors shall be designed and manufactured to be capable of speed control through a variable frequency drive controller. Motors shall be compatible with the furnished VFD controller.

Motors and other electrical control equipment installed in damp or moist areas or in areas of other special conditions shall be designed and approved for the installation. Motors and electrical equipment in explosive locations shall be approved for those locations. Motors located outside buildings shall be totally enclosed.

Electric Wiring:

Electric power wiring conduit, flexible conduit, outlets, relays, thermal switches, auto-off-on switches, magnetic starters, and disconnecting switches shall be provided and installed under Division 16 "Electrical Work" for all electrical equipment furnished or installed as work of this Division.

All equipment control wiring and all automatic temperature control wiring including all necessary contacts, relays, and interlocks, whether low or line voltage, except power wiring, shall be furnished and installed as work of this Division unless shown to be furnished by Division 16. All such wiring shall be in conduit. Installation of any and all wiring done under Division 15 shall be in accordance with the requirements of Division 16, Electrical.

All equipment that requires an electrical connection shall be furnished so that it will operate properly and deliver full capacity on the electrical service available and also satisfy the requirements under "Motors," as specified above.

The Mechanical Contractor must refer to the electrical control equipment and wiring shown on the diagrams. Any changes or additions required by specific equipment furnished shall be the complete responsibility of the Contractor furnishing the equipment.

The Mechanical Contractor must coordinate with the Electrical Contractor to insure that all required components of control work are included and fully understood. No additional cost shall accrue to the Owner as a result of lack of such coordination.

WORK, MATERIALS, AND QUALITY OF EQUIPMENT:

Unless otherwise specified, all materials shall be new and of the best quality of their respective kinds and all labor shall be done in a most thorough and workmanlike manner.

Products or equipment of any of the manufacturers cited herein or any of the products approved by the Addenda may be used. However, where lists of products are cited herein, the one first listed in the design equipment used in drawings and schedules to establish size, quality, function, and capacity standards. If other than design equipment is used, it shall be carefully checked for access to equipment, electrical and control requirements, valving, and piping. Should changes or additions occur in piping, valving, electrical work, etc., or if the work of other Contractors would be revised by the alternate equipment, the cost of all changes shall be borne as work of this Division.

Pipe of foreign manufacture will not be acceptable.

The access to equipment shown on the drawings are the minimum acceptable space requirements. No equipment that reduces or restricts accessibility to this or any other equipment will be considered.

All major items of equipment are specified in the equipment schedules on the drawings or in these specifications and shall be furnished complete with all accessories normally supplied with the catalog item listed and all other accessories necessary for a complete and satisfactory installation.

All mechanics shall be capable journeymen, skilled in the work assigned to them. No one unskilled in the work which he is given to do shall be employed, and all work shall be executed in a skillful and workmanlike manner. All men employed upon this work shall be competent, faithful, orderly, and satisfactory to the Owner.

All welders shall be certified in accordance with Section IX of the ASME Boiler and Pressure Vessel Code, latest Edition.

PROTECTION AGAINST WEATHER AND STORING OF MATERIALS:

All equipment and materials shall be properly stored and protected against moisture, dust, and wind. Coverings or other protection shall be used on all items that may be damaged or rusted or may have performance impaired by adverse weather or moisture conditions. Damage or defect developing before acceptance of the work shall be made good at the Contractor's expense.

All open duct and pipe openings shall be adequately covered at all times.

INSTALLATION CHECK:

An experienced, competent, and authorized representative of the manufacturer or supplier of each item of equipment indicated in the equipment schedule shall visit the site of the work and inspect, check, adjust if necessary, and approve the equipment installation. In each case, the equipment supplier's representative shall be present when the equipment is placed in operation. The equipment supplier's representative shall revisit the job site as often as necessary until all trouble is corrected and the equipment installation and operation is satisfactory to the Engineer.

Each equipment supplier's representative shall furnish to the Owner, through the Engineer, a written report certifying that the equipment (1) has been properly installed and lubricated; (2) is in accurate alignment; (3) is free from any undue stress imposed by connecting piping or anchor bolts; and, (4) has been operated under full load conditions and that it operated satisfactorily.

All costs for this work shall be included in the prices quoted by equipment suppliers.

EQUIPMENT LUBRICATION:

The Contractor shall properly lubricate all pieces of equipment before turning the building over to the Owner. A linen tag shall be attached to each piece of equipment, showing the date of lubrication and the lubricant used. No equipment shall be started until it is properly lubricated.

Necessary time shall be spent with the Owner's Representative to thoroughly familiarize him with all necessary lubrications and maintenance that will be required of him.

Detergent oil as used for automotive purposes shall not be used for this work.

CUTTING AND PATCHING:

No cutting or drilling in structural members shall be done without written approval of the Architect. The work shall be carefully laid out in advance, and cutting, channeling, chasing, or drilling of floors, walls, partitions, ceilings, or other surfaces necessary for the mechanical work shall be carefully done. Any damage to building, piping, or equipment shall be repaired by professional plasterers, masons, concrete workers, etc., and all such work shall be paid for as work of this Division.

When concrete, grading, etc., is disturbed, it shall be restored to original condition as described in the applicable Division of this Specification.

EXCAVATION AND BACKFILLING:

All necessary excavations and backfilling for the Mechanical phase of this project shall be provided as work of this Division. Work shall conform to Division 2, Site Work. Trenches for all underground pipelines shall be excavated to the required depths. The bottom of trenches shall be compacted hard and graded to obtain required fall. Backfill shall be placed in horizontal layers, not exceeding 12 inches in thickness, and properly moistened. Each layer shall be compacted, by suitable equipment, to a density of not less than 95 percent as determined by ASTM D-1557. Sand shall be placed a minimum of 1" below and 1" above piping, etc. After pipelines have been tested, inspected, and approved, the trench shall be backfilled with selected material. Excess earth shall be hauled from the job site. Fill materials approved by the Architect shall be provided as work of this Division.

No trenches shall be cut near or under any footings without consultation first with the Architect's office. Any trenches or excavations more than 30 inches deep shall be tapered, shored, covered, or otherwise made absolutely safe so that no vehicle or persons can be injured by falling into such excavations, or in any way be harmed by cave-ins, shifting earth, rolling rocks, or by drowning. This protection shall be extended to all persons approaching excavation related to this work whether or not such persons are authorized to be in the vicinity of the construction.

The Contractor shall protect from damage all existing underground utilities or utility tunnels indicated on the contract drawings (or field located for the Contractor by the Owner prior to excavation operations). Any damage to such existing utilities or utility tunnels shall be repaired by the Contractor without additional cost to the Owner. Any damage to existing utilities not indicated on the contract drawings or designated by the Owner prior to excavating operations shall be repaired by the Contractor but shall be paid for by the Owner.

All underground piping shall be bedded upon 4" layer of sand. The sand shall be graded to provide proper pipe slope. After pipe is placed the pipe shall be covered with a 12" layer of sand. The rest of the pipe trench shall be filled in 8" lifts compacted to 95%.

ACCESS DOORS:

Provide access doors in walls, ceilings and floors, for access to mechanical equipment such as valves, dampers, VAV boxes, fans, controls, etc. Refer to Division 8 for door specifications. All access doors shall be 24" x 24"

unless otherwise indicated or required. Coordinate location of doors with the Architect prior to installation. If doors are not specified in Division 8, provide the following: Doors in ceilings and wall shall be equal to JR Smith No. 4760 bonderized and painted. Also approved manufacturers are Cesco. Doors in tile walls shall be equal to JR Smith No. 4730 chrome plated. Doors in floors shall be equal to JR Smith No. 4910. Access doors shall be fire rated where required.

CONCRETE BASES AND INSERTS:

Bases:

The concrete bases shall be provided and installed as work of Division 3, Concrete. This Division shall be responsible for the proper size and location of bases and shall furnish all required anchor bolts and sleeves with templates to be installed as work of Division 3, Concrete.

All floor-mounted mechanical equipment shall be set on 6-inch high concrete bases, unless otherwise noted or shown on drawings. Such bases shall extend 6 inches beyond equipment or mounting rails on all sides or as shown on the drawings and shall have a 1-inch beveled edge all around.

Inserts:

Where slotted or other types of inserts required for this work are to be cast into concrete, they shall be furnished as work of this Division. Inserts shall be installed as work of Division 3, Concrete, but under the close supervision and direction of this section.

Concrete inserts and pipe support systems shall be Unistrut P3200 series for all piping where more than one pipe is suspended at a common location. Spacing of the inserts shall match the size and type of pipe and of ductwork being supported. The Unistrut insert and pipe support system shall include all inserts, vertical supports, horizontal support members, clamps, hangers, rollers, bolts, nuts, and any other accessory items for a complete pipe-supporting system. Finish of channels and inserts shall be bonderized green enamel with resin primer.

V-BELT DRIVES:

V-belt drives shall be of fabric and rubber construction of approved manufacture. Multiple belts shall be matches and all belts shall be adjusted to drive the apparatus properly and to prevent slippage and undue wear in starting. Drives shall be designed for 150 percent of the specified motor nameplate rating. Belt guards shall be provided for all exposed belts and drives.

FLASHING:

All pipes, ducts and roof drains which penetrate roofs or exterior walls shall be flashed and sealed watertight under this Division of the specifications. All plumbing vents shall be extended to not less than 12 inches above the roof. Roof flashings shall be furnished by this Contractor and installed by the Roofing Contractor. Flashings shall be seamless 4-pound sheet lead or of the type required by the Roofing Contractor. Flashings shall be of the size required by the Roofing Contractor and shall extend horizontally not less than 12 inches all around. The Mechanical Contractor shall furnish and install flashings for all services and shall flash and counterflash all ducts and through roofs and exterior walls.

SEALING:

Pipe, conduit or duct and sleeve penetrations through fire rated floors and walls shall be sealed with Dow Corning 3-6548 Silicone RTV Foam or an approved equal. Refer to the manufacturers application guide specifications to determine proper installation procedures.

Pipe, conduit or duct and sleeve penetrations through non-fire rated floors and walls shall be sealed with Pecora butyl rubber BC-158 or an approved equal. Spaces greater than 1/4" wide must first be backed with a compressible foam backer rod and then caulked.

Pipe, conduit or duct and sleeve penetrations through below grade foundation walls shall be sealed with Vulkem polyurethane #116 or an approved equal. Spaces greater than 1/4" wide must first be backed with a compressible foam backer rod and then caulked.

After stubbing and/or caulking, all openings are to be thoroughly taped with heavy plastic or butyl duct tape to prevent sound passage.

Waterproof sleeves shall be provided on all piping penetrations through the exterior foundation walls.

CLEANING AND PAINTING:

Cleaning:

After all tests and adjustments have been made and all systems pronounced satisfactory for permanent operation, this Contractor shall clean all exposed piping, ductwork, insulated members, fixture, and equipment installed under this Section and leave them ready for painting. He shall refinish any damaged finish and leave everything in proper working order. The Contractor shall remove all stains or grease marks on walls, floors, glass, hardware, fixtures, or elsewhere, caused by his workman or for which he is responsible. He shall remove all stickers on plumbing fixtures, do all required patching up and repair all work of others damaged by this division of the work, and leave the premises in a clean and orderly condition.

Painting:

Painting of exposed pipe, insulated pipe, ducts, or equipment inside of the building is work of Division 9, Painting. Painting of exposed pipe outside is work of this section. All pipe exposed to the outdoors shall be painted for rust protection. Pipe, equipment, and duct identification is work of Section 15150.

Mechanical Contractor: All equipment which is to be furnished in factory prefinished conditions by the mechanical Contractor shall be left without mark, scratch, or impairment to finish upon completion of job. Any necessary refinishing to match original shall be done. Do not paint over nameplates, serial numbers, or other identifying marks.

Removal of Debris, Etc:

Upon completion of this division of the work, remove all surplus material and rubbish resulting from this work, and leave the premises in a clean and orderly condition.

CONTRACT COMPLETION:

Incomplete and Unacceptable Work:

If additional site visits or design work is required by the Engineer or Architect because of the use of incomplete or unacceptable work by the Contractor, then the Contractor shall reimburse the Engineer and Architect for all additional time and expenses involved.

Maintenance Instructions:

The Contractor shall furnish the Owner complete printed and illustrated operating and maintenance instructions covering all units of mechanical equipment, together with parts lists. This maintenance manual shall be furnished as work of Section 15150.

Instructions To Owner's Representatives:

In addition to any detailed instructions called for, the mechanical Contractor must provide, without expense to the Owner, competent instructors to train the Owner's representatives who will be in charge of the apparatus and equipment, in the care, adjustment, and operation of all parts on the heating, air conditioning, ventilating, plumbing, fire protection, and automatic temperature control equipment. Instruction dates shall be scheduled at time of final inspection. A written report specifying times, dates, and name of personnel instructed shall be forwarded to the Architect. A minimum of four 8-hour instruction periods shall be provided. The instruction periods will be broken down to shorter periods when requested by the Owner. The total instruction hours shall not reduced. The ATC Contractor shall provide 16 additional hours of instructions.

Guarantee:

By the acceptance of any contract award for the work herein described or shown on the drawings, the Contractor assumes the full responsibility imposed by the guarantee as set forth herein and in the General Conditions, and should protect himself through proper guarantees from equipment and special equipment Contractors and from subContractors as their interests may appear.

The guarantee so assumed by the Contractor and as work of this Section is as follows:

That the entire mechanical system, including plumbing, heating, and air-conditioning system shall be quiet in operation.

That the circulation of water shall be complete and even.

That all pipes, conduit, and connections shall be perfectly free from foreign matter and pockets and that all other obstructions to the free passage of air, water, liquid, sewage, and vent shall be removed.

That he shall make promptly and free of charge, upon notice from the Owner, any necessary repairs due to defective workmanship or materials that may occur during a period of (1) years from date of Substantial Completion.
That all specialties, mechanical, and patent devices incorporated in these systems shall be adjusted in a manner that each shall develop its maximum efficiency in the operation of the system; i.e., diffusers shall deliver the designed amount of air shown on drawings, thermostats shall operate to the specified limits, etc.

All equipment and the complete mechanical system shall be guaranteed for a period of (1) years from the date of the Architect's Certificate of Substantial Completion. Any equipment supplier not willing to comply with this guarantee period shall not submit a bid price for this project. The Contractor shall be responsible for a 100-percent guarantee for the system and all items of equipment for this period.

All filters used during construction shall be replaced just before equipment is turned over to the Owner, and all required equipment and parts shall be oiled. Any worn parts shall also be replaced.

TEST RUN:

The Mechanical Contractor shall operate the mechanical system for a minimum of 20 days to prove the operation of the system.

MECHANICAL EQUIPMENT SUPPORT:

Contractor is responsible for supporting the mechanical equipment (i.e. pipes, ducts, fans, etc.) Mechanical equipment shall not be supported from the roof deck. Mechanical equipment shall be supported from the top cord of the roof joists. Intermediate beams, unistruts, etc. shall be secured to the roof joists at locations approved by structural engineer. Contractor shall provide and install all materials necessary to adequately support the mechanical equipment. connection types (i.e. weldings, clips, etc.) shall be in accordance with structural engineer

recommendations. Contractor shall be responsible for support sizing, locations, and types and shall coordinate with job site conditions. Contractor shall comply with structural drawings and specification.

All equipment shall be independently supported from the structure so that it is not depending on the ceiling for support.

END OF SECTION

SECTION 15150 - BALANCING, MAINTENANCE MANUALS, AND IDENTIFICATION

GENERAL CONDITIONS:

All pertinent sections of Section 15100, Division 15, are a part of the work described in this section. Division 1 is a part of this and all other sections of these specifications.

SCOPE OF WORK:

This work shall include the final adjustment, balancing, and identification of all mechanical systems. The work of this section shall include but not to limited to the following.

Identification of piping, ductwork, and equipment furnished and installed as work of Division 15.

Tagging of all valves and controls furnished and installed as work of Division 15.

Balancing and adjustments of the plumbing, heating, air-conditioning, and ventilating systems furnished and installed as work of Division 15.

Supervision of start-up and commissioning of all systems and equipment furnished and installed as work of Division 15.

Submission of Operating and Maintenance Manuals complete with balancing and system commissioning reports.

Coordination of work involving other contractors essential to the final balancing of the system and supervision of the adjustments.

SUBMITTALS:

Submit product data in accordance with Division 1 and Section 15100. Submit the following:

Name and qualifications of Balancing Contractor.
Name of certifying affiliation or certifying Professional Engineer.
Samples of pipe, duct, and equipment identification.
Sample test and balancing data forms.
Sample of O & M manual outline and description of binder.
System commissioning procedures and check list.

IDENTIFICATION:

Pipe and Duct Identification:

Identification of piping and ducts shall be done with "Brady" or "Westline" labels. The color coding shall comply with OSHA ANSI Safety Color Coding Regulations. The means of identification shall be color coded band and an identifying legend to indicate the contents of the pipe and a direction of flow arrow.

The identifying color coded bands, legends, and directional arrows on piping and duct systems shall be located adjacent to each valve, at every point of entry and exit where piping or ducts pass through a wall or ceiling, on each riser and junction, every 50 feet on long continuous lines and adjacent to all special fittings (regulating valves, etc.).

Legends shall be applied on the color band on the perimeter of the pipe in a location that will be readily visible to operating personnel from the floor in the area.

Color coding shall follow ANSI standards:

Material	Background Color	Identifying Legend	Lettering
Domestic cold	Green	Domestic Cold Water	White
Domestic hot	Yellow	Domestic Hot Water	Black
Domestic hot return	White	Domestic Hot Water Return	Black
Propane	Yellow	Propane	Black

Identification of all ductwork, piping, and equipment located above ceilings, either accessible or non-accessible, shall be completed before any ceilings are installed.

Equipment Identification:

Except for individual room heating units and items furnished under Temperature Control, all items of mechanical equipment, including fans, pumps, boilers, and electrical switches and starters for mechanical equipment and gauges shall be labeled.

Information on labels shall include the following:

a. Identification number and name. Generally, this number and name shall be the same as that shown on the drawings or in these specifications.

b. If the item is a fan or pump, the flow and head shall be indicated.

c. If the item is part of a unit, the label shall have, in addition to its item number, the number of the main item it is serving.

d. Valves shall be tagged with the area served and their normal operating positions shall be indicated.

e. Where the main unit served by the valve is apparent, only the valve function needs to be included on the nameplate.

The types of nameplates shall be as follows:

a. Valve tags shall be 1/2-inch embossed aluminum tapes with identification on one side for valves. Tags for magnetic starters shall be screwed to the metal starter cover. Tags shall be Addressograph No. B-5300.

b. Equipment nameplates shall be black faced formica with white engraved lettering at least 3/16 inch high.

Valve tags shall be connected to valve stems by steel rings or chains. Screws shall be used for equipment labels. Prior to installation, the contractor shall submit to the engineer a complete list of all valves and each item of equipment to be identified with the proposed identification.

Control Diagrams:

The Temperature Control Contractor shall provide a schematic control diagram on a blueline print for each separate mechanical system, including the refrigeration system, heating system, fan system, etc. Each diagram shall show a schematic representation of mechanical equipment and location of start-stop switches, insertion thermostats, thermometers, gauges, and automatic valves. The correct operating reading for each control instrument shall be marked on this diagram. A foldout copy binder of these prints shall be included in the Operating & Maintenance Manuals.

Identification of equipment on control diagrams shall correspond with the equipment nameplates furnished by the Mechanical Contractor.

OPERATING AND MAINTENANCE MANUALS:

Work under this section shall be performed by the contractor performing the system testing and balancing or by a Registered Professional Mechanical Engineer that has had previous experience in the writing of these manuals. Six (6) copies of the manuals shall be furnished to the Architect for distribution to the owner.

The "Start-Up and Operation" section is one of the most important in the manual. Information in this section shall be complete and accurately written and shall be verified with the actual equipment on the job, such as switches, starters, relays, automatic controls, etc. A step-by-step start-up procedure shall be described.

The manuals shall include Air-balancing reports, water-balancing reports, system commissioning procedures, start-up tests and reports, equipment and system performance test reports, warranties, and certificates of training given to the owners representatives.

The operating and maintenance manuals shall be as follows:

Binders shall be red buckram with easy-view metal for size 8-1/2 x 11-inch sheets, with capacity expandable from 2 inches to 3-1/2 inches as required for the project. Construction shall be rivet-through with library corners. No. 12 backbone and lining shall be the same material as the cover. The front cover and backbone shall be foil-stamped in white as follows:

OPERATING AND MAINTENANCE
MANUAL
FOR THE

Insert Project Name
2008

SALT LAKE CITY, UTAH

Insert Architect Name

VAN BOERUM & FRANK ASSOCIATES, Inc.
Consulting Engineers

Binders shall be a manufactured by Hiller Bookbinding.

An index sheet typed on AICO Gold-Line indexes shall be provided in the front of the binder. The manual shall be organized as follows:

SECTION I: START-UP AND OPERATION

FORWARD

START-UP PROCEDURE AND OPERATION OF SYSTEM

MAINTENANCE AND LUBRICATION TABLE

AUTOMATIC TEMPERATURE CONTROL DESCRIPTION OF OPERATION, INTERLOCK AND CONTROL DIAGRAMS, AND CONTROL PANELS.

SECTION 2: OPERATION AND MAINTENANCE BULLETINS

ITEM	MANUFACTURER	VENDOR	TELEPHONE

A. AUTOMATIC TEMPERATURE CONTROL

B. SPECIALIZED EQUIPMENT

C. PLUMBING AND HEATING SPECIALTIES

D. HEATING AND VENTILATING EQUIPMENT

SECTION 3: MAINTENANCE AND LUBRICATION REFERENCE TABLE

SECTION 4: AIR AND WATER SYSTEM BALANCING REPORTS

SECTION 5: EQUIPMENT WARRANTIES AND TRAINING CERTIFICATES

SECTION 6: SYSTEM COMMISSIONING REPORTS

System commissioning report

Equipment start-up certificates

SYSTEM AIR AND WATER BALANCE:

These systems shall be balanced and adjusted by person or persons fully familiar with mechanical systems of the type specified in this Division and whose main business is the balancing and adjustment of mechanical systems.

Contractors approved to do this work are, Bob's Test and Balancing Co., Diamond Test and Balancing, Tempco and Danis Test & Balancing. The balancing contractor must either be certified by NEBB, AABC, or must have all data, procedures, reports, etc. certified by a licensed Professional Mechanical Engineer actively engaged in the heating and air-conditioning field, who shall supervise the work.

The testing and balancing subcontractor shall have the necessary experienced personnel and equipment to accomplish the work. Upon request, the testing and balancing subcontractor shall furnish a list of at least (10) ten separate buildings of comparable size and system types to this project which have been balanced by this subcontractor.

Prior to commencement of the testing and balancing, the mechanical system shall be properly commissioned and ready for operation. Representatives of the equipment manufacturers shall have previously visited the project to verify that their equipment is ready for operation.

Seven (4) copies of this report shall be furnished so that one can be included in each Operating and Maintenance Manual and one copy is to be furnished to the Mechanical Engineer.

ADJUSTMENT OF AIR DISTRIBUTION SYSTEMS:

The Sheet Metal Contractor shall assign the foreman or mechanic who installed the sheet-metal air-handling systems to assist in the air-balancing work.

All supply and exhaust air fans shall be running.

The Contractor shall measure rpm and adjust the sheaves of all fans to handle design quantity of air. He shall check and record motor amperage. The drives shall be changed as required, at the Contractor's expense, to provide the specified air quantities.

Test and record motor full load amperes.

Supply and return fan cfm shall be checked and adjusted to verify the proper return fan tracking. Adjust supply system static pressure to provide minimum static pressure necessary at the inlet of terminal boxes.

A pressure test shall be made to verify the proper air flow from clean areas toward less clean.

Test and adjust all terminal constant volume, variable volume, single duct and reheat boxes. Check minimum inlet static pressure and verify proper modulation from maximum to minimum capacities.

Adjust all registers, grilles and diffusers to deliver design cfm plus or minus 10 percent of design requirements.

All tests and readings shall include required FPM and CFM, initial FPM and CFM and final FPM and CFM after adjustments. All adjustments shall be made to minimize drafts.

The Temperature Control Contractor shall have a mechanic available to the personnel adjusting the air system for assistance in adjusting any defective control devices.

Test Run:
The Mechanical Contractor shall operate the mechanical system for a minimum of 20 days to prove the operation of the system. During this test run, this Contractor shall provide two temperature (0 - 200 degrees F) recorders and record for a period of 7 days in areas so designated by the Design Engineer. A summary of the recorded information will be included with the O & M Manuals.

Final Adjustment:

This Contractor shall be responsible for the final balancing and adjustment of all mechanical systems with necessary adjustments being made to provide a satisfactory system. If adjustments are required to produce other than conditions shown on the drawings because of job conditions, then these adjustments shall be made without extra costs.

The pressure taps, access openings, etc., necessary to balance the system, shall be installed by other Mechanical Contractors where directed by this Contractor.

The Balancing Contractor shall immediately notify the Architect, in writing, if any item of equipment, diffusers, grilles, etc., fails to operate within 5 percent of its specified capacity at the completion of the balancing of the system.

The report submitted by this contractor shall be certified to be correct by a Mechanical Engineer licensed in the State of Utah, who has originally been approved by the Architect. The reports shall be submitted to the General Contractor and he shall submit them to the Architect for review before submitting them to the Owner.

SYSTEM COMMISSIONING:

This contractor shall be responsible for developing a procedure for commissioning all equipment and systems furnished and installed as part of work of Division 15. This procedure along with a check list shall be submitted to the Engineer for review. The commissioning procedure shall include a critical path chart showing the work to be performed, at which stage of construction the commissioning procedure should be performed, and the contractor who will perform the procedure. A completed check list showing all commissioning procedures, date of completion of procedure, and individuals performing procedure shall be completed and submitted to the Engineer before final

inspection. Copies of the check list shall be included in the Operating and Maintenance Manuals. The following is the minimum requirements for a check list.

General Items:

Bearings Lubricated

Rotation Correct and Free

Correct Thermal Overload Protection

Shipping Restraints Removed

Equipment Secured in Place

Equipment Clean and Free of Debris

Vibration Isolators Correctly Located with Proper Springs

Motors Not Overloaded

END OF SECTION

SECTION 15200 - INSULATION

GENERAL CONDITIONS:

All pertinent sections of Section 15100, Division 15, are a part of the work described in this section. Division 1 is a part of this and all other sections of these specifications.

SCOPE OF WORK:

This work shall include but not be limited to the installation of a complete thermal and acoustic insulation system, including the following:

Covering for all hot water heating supply and return, culinary hot water, recirculating hot water and cold water piping.

All insulation shall be installed in accordance with the recommendations of the National Insulation Contractors Association.

RELATED WORK:

Interior acoustical duct lining is specified in Section 15800, Air Distribution, Heating and Air-Conditioning. Pipe hangers and pipe shields are specified in section 15300.

SUBMITTALS:

Submit product data in accordance with Division 1 and Section 15100. Submit the following:

Pipe Insulation
Duct Insulation
Equipment Insulation
Cements and Finishes
Application Procedures

MATERIALS:

Approved Manufacturers:

Fiberglass insulation shall meet the requirements of ASTM C 547 as manufactured by Manville, Certain-Teed, KNAUF, or Owens-Corning. Calcium silicate insulation shall meet the requirements of ASTM C 533, as manufactured by Manville, Owens-Corning, or Pabco.

Flexible unicellular insulation shall meet the requirements of ASTM C 534, as manufactured by IMCOA/IMCOLOCK, IMCOA/IMCOSHIELD, Armstrong, Halstead, or Rubatex.

Smoke Burning Characteristics:

Insulation materials, adhesives, coatings and other accessories shall have burning characteristics as determined by ASTM E 84 and tested with UBC Standard 42-1 shall have a flame spread and smoke contribution as follows:

A. All batting insulation shall have a flame spread of 0 to 25 and a smoke contribution of 0 to 50.

B. All foam plastic insulation shall have a flame spread of 0 to 75 and a smoke contribution of 0 to 50.

C. Pipe and tubing insulation shall have a flame spread of 0 to 25 and a smoke contribution of 0 to 50.

D. Duct insulation shall have a flame spread of 0 to 25 and a smoke contribution of 0 to 50.

Insulation Thickness:

Insulation thicknesses in Table A are based on insulation having thermal resistivity in the range of 4.0 to 4.6 hr. °F square foot/Btu per inch of thickness on a flat surface at a mean temperature of 75°F.

TABLE 'A' - MINIMUM PIPE INSULATION

INSULATION THICKNESS IN INCHES FOR *1 PIPE SIZES *2

PIPING RANGE SYSTEMS TYPES	TEMPER-ATURE UP TO °F	RUN-OUTS AND 2" *1	8" 1" TO LESS	1-1/4" TO 2"	2-1/2" TO 4"	5" LAR-6"	AND GER
HEATING SYSTEMS							
Low temperature	120-200	1/2	1	1	1-1/2	1-1/2	1-1/2
COOLING SYSTEMS							
Domestic water	40	1	1	1-1/2	1-1/2	1-1/2	1-1/2

*1 Runouts not exceeding 12 feet in length to individual terminal units.
*2 For piping exposed to outdoor air, increase thickness by 1/2 inch.
For the purposes of the following Table A the following fluid temperatures and pressures are to be used unless specified otherwise:

Heating hot water is 200 °F
Domestic hot water is 140 °F
Recirculating domestic hot is 110 °F
[**check table A before changing temperatures**]

Domestic Water:

All domestic hot water and cold water piping shall be covered with Owens-Corning ASJ-25 fiberglass pipe insulation with vapor seal jacket. Insulation thickness shall be 1/2-inch for all cold water piping. See Table A for thickness of insulation for hot water piping. Insulation thickness for all recirculating hot water shall be the same thickness as shown in Table A for chilled water lines. Fittings shall be similarly insulated with a fiberglass blanket insulation covered with a premolded PVC cover.

Roof Drainage and Roof Drainage Overflow Lines:

All piping above grade shall be insulated with 1/2-inch thick Owens-Corning ASJ-25 fiberglass pipe insulation with vapor barrier jacket. The insulation shall be applied over clean, dry pipe with all joints firmly butted together. Fittings shall be similarly insulated with a fiberglass blanket insulation covered with a premolded PVC cover. Cover to be sealed to vapor seal jacket on piping. Provide an aluminum fitting cover where pipe is covered with an aluminum jacket. All rain leader bowls shall be insulated with fiberglass insulation with a field applied vapor barrier jacket consisting of fiberglass reinforced cloth and finished with insulating cement to form a smooth surface.

Mechanical Coverings:

All insulated piping in Mechanical rooms, Fan rooms, and Boiler rooms shall be covered a color coded Ceel-Tite 550 series PVC jacket or an 0.016 aluminum jacket as scheduled below:

Pipe	Jacket	[**other colors available
Heating hot water	Yellow PVC	such as yellow, green, gray
Domestic hot water	Orange PVC	
Other piping	White PVC	

GENERAL REQUIREMENTS:

All insulation shall be installed in accordance with the recommendations of the Manufacturer and National Insulation Contractors Association, MICA.

Pipe Insulation:

Prior to application of insulating materials, surfaces to be insulated shall be brushed clean and made free from rust, scale, grease, dirt, and other deleterious materials. Insulation shall be installed to facilitate removal for making repairs. Insulation sections or blocks shall be placed so the least possible damage to insulation will result from inspection or repair of piping or equipment to which it is applied.

Wherever a leak from a valve or other source might drip onto an insulated surface, the surface shall be protected with 22-gauge aluminum band rolled up at the ends and large enough to prevent dripping or splashing on surrounding areas.

Insofar as possible, pipe insulation shall be applied in sectional form. When segmental form is used, segments shall be fit to curved surfaces to which they are applied. All joints shall be carefully pointed with cement. A thin finishing coat of insulating cement and OCF fitting mastic shall be applied on segmental forms of covering to present a smooth, even surface. Calcium silicate insulation shall be installed in staggered pattern and shall be wired in place at 9 inches on center with 16 ga wire.

All piping exposed to the weather shall be covered with a 0.024 thick embossed aluminum jacket pop-riveted and banded at 12 inches on center. All joints shall be caulked and sealed watertight with a suitable silicone sealant. All seams shall be located on the bottom of the pipe away from the weather.

Insulation shall not be applied over flanged joints until piping has been brought up to operating temperature and flange bolts have been fully tightened.

For all hot and non-cold fluid systems, insulation shall be beveled to expose all flanges, unions, valves, strainers and special accessories. Raw ends of insulation shall covered with finishing cement to provide a smooth water proof surface.

For all cold water and cold fluid systems, all flanges, valves, control valves, and special accessories including pumps shall be insulated with covering equal in temperature resistance and thickness to that of connecting piping. A short piece of covering shall be installed next to flanges on both sides of joints so that this piece can be removed and the bolts taken out of the joint without disturbing the covering on the remainder of the line. Covers for all flanges, unions, valves, and special accessories shall be constructed in two halves. Provide a two piece removable insulated box for chilled water pumps. Insulation shall be of the equivalent thickness as for the piping system and shall be covered with a matching PVC or aluminum jacket.

Duct Wrap Insulation:

Insulation shall be wrapped tightly on the duct with all circumferential joints butted and longitudinal joints overlapped a minimum of 2 inches. Insulation shall be adhered to metal with 4-inch strips of insulation bonding adhesive at 8 inches o.c. and taped with foil-reinforced kraft tape not less than 3 inches wide. the same method shall be used for longitudinal joints,. All pin penetrations or punctures in facing shall also be taped. All joints shall be covered with foil-reinforced kraft tape 3 inches wide.

Testing and Approval:

No pipe insulation shall be applied until the piping has been pressure checked and approved. No duct insulation shall be applied until the ducts have been inspected and approved. All insulation shall be applied strictly in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 15250 - SEISMIC AND VIBRATION CONTROL

GENERAL CONDITIONS:

All pertinent sections of Section 15100, Division 15, are a part of the work described in this section. Division 1 is a part of this and all other sections of these specifications.

SCOPE OF WORK:

The scope of work shall include all labor, material, and equipment necessary for a complete anchorage and seismic restraint system and vibration isolation system for all work included as part of Division 15. The system design and installation shall be based on Seismic Zone 2b of the International Building Code, and other standards listed below.

The work shall include all mechanical isolated and non-isolated equipment, ducts and piping systems which shall include:

1. Water heaters
2. Rectangular ductwork 6 sq. ft. in cross-sectioned area and larger
3. All piping 2-1/2" dia and larger except waste, vent and roof drainage piping
4. Inline fans.

REFERENCE STANDARDS:

1. International Building Code 2006

2. NFPA Bulletin 90A, Current Edition

3. UL Standard 181

4. Tri-Services Manual, Fagel Et Al, 1973

5. SMACNA Guidelines for Seismic Restraints of Mechanical Systems

6. ASHRAE - American Society of Heating, Ventilating and Air Conditioning Engineers.

SUBMITTALS:

Submit product data in accordance with Division 1 and section 15100. Submit the following:

Restraint system and anchorage method to be used for each piece of equipment.

Shop drawings showing size, hanger length, and the location of all seismic restraints for piping and ductwork.

Seismic restraints and calculations for all flexible mounted equipment.

Vibration isolators and flexible couplings.

Details for all the isolators and seismic bracing with snubbers proposed for items in this specification and on the Drawings.

Details for steel frames, concrete inertia bases, and anchors to be used in conjunction with the isolation of the items in this specification and drawings.

Clearly outlined procedures for installing and adjusting the isolators, seismic bracing anchors and snubbers.

SEISMIC REQUIREMENTS AND QUALIFICATIONS:

The Mechanical Contractor shall be responsible for supplying and installing equipment, vibration isolators, flexible connections, rigid steel frames, anchors, inserts, hangers and attachments, supports, seismic snubbers and bracing to comply with the International Building Code.

All supports, hangers, bases, braces and anchorage for all non-isolated equipment, ductwork and piping shall be installed as detailed and specified in the contract documents. Specific requirements on equipment anchorage and restraints, locations and sizes shall be furnished by the contractor and submitted to the Project Engineer for review after shop drawings for mechanical equipment have been reviewed.

All supports, hangers, bases, anchorage and bracing for all isolated equipment shall be designed by a professional engineer employed by the restraint manufacturer, qualified with seismic experience in bracing for mechanical equipment. Shop drawings submitted for earthquake bracing and anchors shall bear the Engineer's signed professional seal.

The Contractor shall require all equipment suppliers to furnish equipment that meets the seismic code, with bases designed to receive seismic bracing and/or anchorage. All isolated mechanical equipment bracing to be used in the project shall be designed from the Equipment Shop Drawings certified correct by the equipment manufacturer for Seismic Zone 2B.
Manufacturers and suppliers of restraint equipment and systems approved for use by the Contractor, for isolated and non-isolated systems, are Mason Industries, Inc., Korfund, Amber/Booth Company, Vibration Mountings & Control Co. Manufacturer of seismic restraint equipment and the vibration isolators for isolated equipment shall be the same manufacturer.

Manufacturers representative shall inspect the project as necessary and provide a report once everything is properly seismically restrained.

SPECIAL SOUND QUIETING:

The seismic and vibration control manufacturer shall analyze the operating conditions and make recommendations for any modifications and additions to the Owner's Representative.

SEISMIC REQUIREMENTS:

All mechanical equipment, piping and ductwork shall be braced, snubbed or supported to withstand seismic disturbances and remain operational. Furnish all engineering, labor, materials and equipment to provide protection against seismic disturbances as specified herein.

Isolated Equipment:

All vibration isolated equipment shall be mounted on rigid steel frames or concrete bases as described in the vibration isolation section of this specifications unless the equipment manufacturer certified direct attachment capability. Each spring mounted base shall have a minimum of four all-directional seismic snubbers that are double acting and located as close to the vibration isolators as possible to facilitate attachment both to the base and the structure. The snubbers shall consist of interlocking steel members restrained by shock absorbent rubber materials.

Elastomeric material shall be replaceable and a minimum of 3/4" thick. Snubbers shall be manufactured with an air gap between hard and resilient material of not less than 1/8" nor more than 1/4". Snubbers shall be installed with factory set clearances. Snubbers shall be equal to Mason Z-1011.

A one "g" minimum vertical and lateral level shall be used in the design of all snubbers restraining isolated equipment.

Piping:

All isolated and non-isolated piping 2-1/2" I.D. and larger shall be protected in all planes by restraints to accommodate thermal movement as well as restrain seismic motion. Locations shall be as scheduled and shall include but not be limited to:

a. At all drops to equipment and at flexible connections.

b. At all 45° or greater changes in direction of pipe.

c. At horizontal runs of pipe, not to exceed 30 feet O.C. spacing.

d. Piping shall be restrained by a cable restraining system using a minimum of two cables at all restraint points.

e. Shop drawings shall be submitted with the locations of all restraints shown on a floor plan and noting the size and type of restraint to be used.

f. Gas piping shall have additional restraints as scheduled.

Non-Isolated Equipment:

The restraint systems for all non-isolated equipment shall be designed according to Table 23P, sec. 2312 of the Uniform Building Code with an importance factor of 1.5, a site factor Z = 0.75 and a Cp = 0.3.

Horizontal force factor for elements of structures. In addition, the vertical forces restraint requirement shall be computed as 1/2 the value of the horizontal forces. All equipment not anchored directly to floors shall be restrained by cables as designed and furnished by the Restraint Manufacturer.

Ductwork:

All isolated and non-isolated rectangular ductwork 4 sq. feet in cross-sectional area and larger and all isolated and not isolated round ductwork 28" dia and larger shall be protected in all planes by restraints to accommodate thermal movement as well as restrain seismic motion. Locations shall be as determined by the Seismic Restraint Manufacturer and shall include but not be limited to:

a. All horizontal runs of ductwork, not to exceed 30 feet O.C. spacing.

b. At all 45° or greater changes in direction of ductwork.

c. At each end of duct runs and drops to equipment.

d. At each flexible connection.

e. Ducts shall be restrained by a cable restraining system using a minimum of two cables at all restraint points.

f. Shop drawings shall be submitted with the size and type of all restraints to be used. A floor plan shall be provided to show the locations of all restraints.

VIBRATION ISOLATION REQUIREMENTS:

All mechanical equipment 1 horsepower and over, unless otherwise noted, shall be isolated from the structure by means of resilient vibration and noise isolators in accordance with Table 27, Chapter 52 in the 1987 HVAC Systems & Applications ASHRAE Handbook. Vibration isolators shall be designed and supplied by the manufacturer

supplying seismic restraint equipment. Vibration isolation equipment, including spring isolators, spring and rubber hangers, resilient pads, rails, inertia bases, etc., shall be by Mason M.W. Sausse, Korfund, Amber Booth or Vibration Mountings and Control Co., or equal. All model numbers herein refer to Mason. All such isolation equipment shall be supplied by a single manufacturer.

Isolation equipment, hangers, connections, and other isolating devices shall be designed and installed to prevent transmission of vibration to the structure from the mechanical equipment or any associated piping and ductwork.

For equipment on ground - support slabs adjacent to sensitive areas, use recommendations in the 20 ft span column, Table 27, Chapter 52 of the 1987 ASHRAE Handbook.

For all roofs and for floors constructed with open web joists, thin long span slabs, wooden construction and any unusual light weight construction, all equipment weighing more than 300 pounds shall be evaluated to determine the additional deflection of the structure caused by the equipment weight. Isolator deflection should be 15 times this additional deflection or the deflection shown in Table 27, Chapter 52, of the 1987 ASHRAE Handbook, whichever is greater.

Support from Below with Spring Isolators: Model SSFLH earthquake motion restrained spring mounts with freestanding stable steel springs, leveling bolts, corrosion resistant finish, motion limiting design, uplift restraining bolts, and 1/4" ribbed neoprene noise stop pad. The isolators shall accept a force in any direction up to 1.0 G without failure, and shall limit movement to 0.75" in any direction. Springs shall have a 50% overload capacity. Size as required to achieve specified static deflection. Outer diameter of spring proper shall not be less than 0.8 of spring height when in loaded position.

Support from Above with Spring and Rubber Hangers: Shall be combination spring and neoprene hangers. The hanger bracket shall have a 500 percent overload capability and shall allow up to 15 degree hanger rod misalignment without short-circuiting. Springs shall have a 50 percent overload capacity. Provide seismic bracing as required. Rails: Shall be structural steel beam base with height saving brackets, pre-located and drilled anchor holes and a corrosion resistant finish.

All piping and ductwork shall be installed to prevent transmission of noise and vibration into the structure.

Vertical pipe risers shall be isolated from the structure by means of vibration and noise isolating expansion hangers. The hangers shall have a minimum rated deflection of four times the anticipated pipe movement and shall be enclosed in a housing for fail-safe equipment.

Flexible connections shall be incorporated in the ductwork adjacent to all air-moving units.

Provide 1" spring isolators for fans.

END OF SECTION

SECTION 15300 - PIPING SYSTEMS, SPECIALTIES AND VALVES

GENERAL CONDITIONS:

All pertinent sections of Section 15100, Division 15, are a part of the work described in this section. Division 1 is a part of this and all other sections of these specifications.

SCOPE OF WORK:

This work includes furnishing all labor and materials to complete all piping systems including piping specialties and valves for the HVAC and plumbing systems.

SUBMITTALS:

Submit product data in accordance with Division 1 and Section 15100. Submit the following:

Pipe, couplings, and fittings
Valves
Hangers and insulated pipe supports
Specialty Items
Valve Assemblies

PIPE AND FITTINGS:

NO PIPE OF A FOREIGN MANUFACTURER WILL BE ACCEPTABLE.

All piping, fittings, flanges, etc. shall be free from defects and shall comply with the appropriate ASTM specifications.

Black and Galvanized Steel Pipe: ASTM A53 ERW Grade B, Standard Weight (Schedule 40) or Extra Strong (Schedule 80) as specified.

Copper Tubing: ASTM B88, Type L or K as specified.

Cast Iron Soil Pipe and Fittings: ASTM A74

Ductile Iron Pipe and Fittings: Ductile iron pipe, where designated, shall be centrifugal spun ductile iron, Class 50 or 51 (as required) rated for 350 psi at five feet (5') of cover. Ductile iron pipe shall have a standard thickness cement lining and shall conform to all requirements of AWWA Specification C151-76 for centrifugal spun ductile iron pipe with "push-on" or bell and spigot type joints. Fittings shall be cast iron Class 250 (250 psi rated) with a safety factory of 3:1 and mechanical joint end. They shall conform to AWWA Specification C110-64. All pipe and fittings shall be coated with a bituminous coal tar coating 1 mil. thick. Where pipe couplings are required, they shall be Smith & Blair Type 411, 413, 415, 416, 433, 435 rated for 250 psi with a 3:1 safety factor.

Welded Black Steel Fittings: ASTM A234 Grade B, 150-pound for Standard Weight Piping, 300-pound for Extra Strong Piping, or of weight or Schedule of matching piping.

Threaded Malleable Iron Fittings: ANSI B16.3, 150-pound for Standard Weight Piping, 300-pound for Extra Strong Piping, or of weight or Schedule of matching piping either black or galvanized to match piping.

Welded Flanges: ASTM A181 Grade B, 150-pound for Standard Weight Piping, 300-pound for Extra Strong Piping or of equal weight of connected equipment.

Copper Fittings: Wrought Copper, ANSI specification B16.22.

Propane piping in the building and not buried shall be standard weight black steel pipe and shall have welded fittings. Gas piping buried shall be Polyethylene pipe with continuous 18 gauge tracing wire with Schedule 40 black steel epoxy coated transition risers and/or transition fittings per ASTM D2513 approved and installed in accordance with 2003 International Fuel & Gas Piping Code.

Domestic hot water, hot water return, and cold water piping shall be type L or K hard tempered copper pipe with wrought-copper fittings using 95-5 solder. Standard weight galvanized steel pipe with galvanized malleable iron screwed fittings or mechanical grooved galvanized iron fittings may be used in lieu of copper on sizes 3-inches and larger.

Domestic hot and cold water piping buried below grade shall be Type K soft tempered (annealed) copper without fittings or joints and covered with IMCOA Imcoshield unicellular insulation.

Soil, waste and vent lines inside building shall be standard weight cast iron with drainage type fittings. All soil, waste, and vent piping below ground shall be hub and spigot standard weight cast iron with Ty-Seal neoprene gaskets. Waste and vent joints for cast-iron waste and vent piping above ground shall be Ty-Seal neoprene gaskets or Tyler No-Hub with high torque Clamp-All stainless steel couplings and neoprene gaskets.

Downspouts and rain water conductors above ground shall be either standard weight galvanized steel with Durham drainage fittings or standard weight cast iron with Ty-Seal gasketed joint fittings or Tyler No-Hub with high torque Clamp-All stainless steel couplings and neoprene gaskets. Under ground conductors shall be standard weight cast iron with joints as specified for under ground soil lines.

Roof drains and storm drainage lines outside of the building shall be as specified in Division 2.

PIPE COUPLINGS:

Flanges and Gaskets:

All flanges, gaskets and bolting materials shall comply with ANSI B31-9.

Flanges: Forged steel, ASTM A181 Grade II, ANSI Specification B16.5 flanges for a working pressure at 150 psi, welding neck with 1/16" raised face, except where mating to flat faced valves or equipment, in which case flat face shall be used.

Flange Gaskets: Full faced or flat ring, to suit flange facings, compressed non-asbestos with synthetic rubber binder, 1/16" thick. Provide spiral;-wound Flexitallic gaskets for all flanges in steam systems operating above 30 psig.

Flange Bolting: Bolts, studs, and washers shall be carbon steel, ASTM A-307, Grade B, with heavy hex heads. ASTM A-325 bolts or studs shall be used for all flanges in steam systems operating above 30 psig. Nuts shall be heavy hexagon series alloy steel, ASTM A-194, Grade 1 or better. All bolts and nuts shall be cadmium or zinc plated. Bolt tightening sequence and tensioning torque shall be in accordance with recommendation of gasket manufacturer.

Unions:

Unions shall generally be used on all connections to automatic valves and equipment and wherever necessary to prevent undue difficulty in making repairs or replacements. In general, unions are not required for flanged valves or equipment with flanged connections.

Grinnell 463, 250-psi, malleable iron ground joint, brass to iron seat unions shall be used on all threaded piping 2 inches and smaller.

Grinnell 487, 150-psi cast-iron gasket type, flanges with gaskets, unions shall be used on all threaded piping 2-1/2 inches and larger.

Grinnell Gruvlok mechanical pipe couplings for 2-1/2" and larger steel pipe.

In general, unions shall be provided at the following locations for all connecting piping:

a. At any plumbing equipment requiring servicing.

Insulating Fittings:

Dielectric unions or couplings as manufactured by Walter Vallet Company or Victaulic shall be installed to connect dissimilar metals (such as steel and copper) to prevent electrolytic action.

VALVES AND COCKS:

Nameplate or markings on each valve shall show manufacturer or trademark, size, grade, and pressure-temperature service rating.

Unless otherwise specified, all valves in connection with piping shall be Hammond, Milwaukee, Keystone, Crane, Centerline, Walworth, NIBCO, Stockam, Watts, or Grinnell. Ball valves shall be bronze with bronze ball, teflon seat, indicator dial, insulated handle, and adjustable packing. Gate or butterfly valves shall be used on all water piping 2-1/2 inches and larger. Ball or globe valves may be used on all water piping 2 inches and smaller. Exceptions, if any, are shown on the plans or noted in specific sections of the specifications. All valves 2 inches and smaller shall be all bronze construction. Companion flanges shall be provided for butterfly screwed connections. Companion flanges shall be provided for butterfly valves and nonslam check valves. Valves, except where noted in specific sections, shall be rated for a minimum of 125-psi steam working pressure at 353 degrees F.

Valves locations are either shown or noted on plans; generally, however, any valve inadvertently omitted, or customarily furnished, or necessary for the proper maintenance and operation of this system shall be furnished as work of this Division.

Valves shall be installed with stems horizontal or above. Where possible, valves shall be located for operation from floors or platforms. Chain wheels or valve extensions shall be provided where valves are more than 11 feet above floors or platforms. Glands shall be tightened and gland packing added as required.

Nonslam check valves shall be used in the discharge lines from all pumps, except in-line pumps.

The following valves are used for design and descriptive purposes and to establish a standard of quality:

Check valves 2 inches and smaller shall be Milwaukee 509 or 1509; Crane No. 36 or No. 1342; NIBCO #T413-B or S-413-B; Grinnell 3300 or 3300SJ.

Butterfly valve 2" and smaller shall be Milwaukee Butterball BB2-100 or BB2-350.

Ball valves shall be Milwaukee BA-100 full ported two-piece construction, or Milwaukee BA-300 full ported three piece construction or Watts B-6000.

Balancing cocks 2 inches and smaller shall be Crane No. 250 or Milwaukee Butterball BB2-100 or BB2-350 with memory stop.

Gas valves 1-1/4 inches and smaller shall be Crane No. 250 square head or Milwaukee Butterball BB2-100.

Air vent valves shall be Crane No. 88 or Milwaukee 600, 200-psi
working pressure, 3/8 inch bronze needle-point globe.

Valve assemblies by Flowset or HCI may be used where approved.

SPECIALTIES:

Pressure Gauges:

The Contractor shall furnish and install U.S. Gauge Series 5001, Trerice, Marsh, Marshalltown, or Ashcroft, 3-1/2 inch dial or as noted on the drawings, black cast-aluminum pressure gauges and chrome-plated ring. All gauges shall be provided with a shutoff cock and snubber. Each gauge shall be of the free-standing repairable type, with graduations and scale suitable for the pressure encountered. Compound gauges shall be installed where necessary. A list of all gauges with graduations, type, and locations shall be submitted to the Engineer for approval before any gauge is installed.

Strainers:

Strainers shall be Keckley, Sarco, Victaulic, or Webster, of the self-cleaning type. Perforations in strainers shall be 1/16 inch in diameter. Blowoff ball valves with shall be provided for all strainers. A threaded hose connection shall be provided on all strainers located above ceilings. The outlet of all other strainer blowoff shall be piped to above floor in a location adjacent to a wall or so that traffic or accessibility to equipment is not restricted and so that any item or piece of equipment is not damaged. Pressure rating of strainers shall be equal to but in no case less than the pressure testing of adjoining valves.

PIPE HANGERS AND SUPPORTS:

All necessary structural members, hangers, and supports of approved design shall be provided to keep piping in proper alignment and to prevent transmission of injurious thrusts and vibrations. Pipe hangers shall generally be of the clevis pipe-clamp type with suspension bolts. All bolts shall have provision for vertical adjustment and shall be equipped with locknuts. Where concrete inserts are used, they shall be suitably reinforced. The Contractor shall obtain approval of the Architect for the location of such inserts prior to their installation. Pipe supports in tunnels shall be roller type with protective saddles. Spring and spring roller hangers shall be used wherever vertical movement of pipe occurs so that pipe and pipe supports shall always be in absolute contact. Expansion shields may be used provided that the hanger is not attached rigidly to the expansion bolt, but is supported from a suitable bracket held in place by expansion bolts. No hanger shall be welded directly to steel joists. Where joists occur, clips shall be installed and hanger rod attached to clips. All piping hung from joists shall be hung from joist panel points. Protective saddles shall be provided on all insulated piping at point of hanger. Hangers shall not contact pipe where pipe is specified to be insulated and hangers shall not penetrate insulation.

The following is a schedule of maximum spacing for hangers or other supports and sizes of suspension rods for piping. In addition to the spacing listed, an additional hanger shall be provided 1 foot 0 inches from each pipe drop, rise, or turn.

Pipe Size	Rod Diameter	Maximum Spacing
1-1/4 in. and smaller	1/2 in.	6 ft.
1-1/2 in. and 2 in.	1/2 in.	9 ft.
2-1/2 in. and 3 in.	5/8 in.	10 ft.
4 in. and 6 in.	3/4 in.	10 ft.
8 in. and 10 in.	7/8 in.	10 ft.
12 in. and 814 in.	1 in.	10 ft.

Pipes larger than 3 inches in diameter must be hung from beams. Where beam spacing is greater than a 10 foot 0 inch span for pipes, intermediate beams must be installed to support pipes. Groups of pipes anchored to floor slabs shall not exceed a 300-pound load between beams. Intermediate beams shall be provided to support pipes if a 300-pound load is exceeded.

Pipes larger than 3 inches which must be supported from roof joists shall be hung from every joist (max. 7'-0" o.c.). the hangers shall be within 3 inches of panel points or the mechanical Contractor shall add a brace to the joist as per the structural general notes or as directed by the architect.

Pipe hangers shall not be welded to metal pan floor. Pipe hangers shall be concrete inserts installed in holes drilled in concrete.

All hangers, supports, and anchors shall be assembled with heavy pattern, hexagon carbon steel nuts.

Perforated metal strap shall not be permitted.

Pipes above ceilings are to be grouped together and either hung from individual rod hangers or on Unistrut trapeze hangers as shown on the drawings. Pipes are to be run as high as possible for maximum clearance of attic spaces.

Risers shall be properly supported and guided at each floor. Pipe hangers, inserts, rollers, etc., and all necessary accessories required to support piping shall be provided by the Contractor, unless noted otherwise.

The Contractor shall install all the metal supports in equipment rooms to form a pipe rack as detailed on the plans. All hot water piping, steam, and condensate return installed on the pipe racks are to be installed on pipe saddles and cast iron rollers. All other piping installed on racks is to be provided with metal saddles and U-bolt guide supports and supported from the metal frame of the rack.

All soil, waste, and vent stacks shall be substantially supported at the base with either a base stack fitting and concrete block or a riser clamp resting on the floor slab.

All pipe hangers, inserts, trapezes, etc., and all necessary accessories required to support the piping shall be provided by this Contractor.

All pipe hangers shall be installed outside of insulation on all insulated lines.

Manufacturers may be Blaw-Knox, Grinnell, or Pipe Shields, Inc.

Insulated Pipe Supports:

Insulated pipe supports shall be furnished and installed by the Mechanical Contractor on all insulated pipe and tubing according to the following tables. See Pipe Insulation Specification Section. Supports shall be Pipe Shields, Inc. All designations as to hanger type refer to Pipe Shields, Inc., model numbers.

Horizontal Pipes:

Model Designations

Pipe Size	Maximum Horizontal Spacing	In Ring Or Clevis Hanger		On Flat SurfaceRoll		On Pipe	
		Cold	Hot	Cold	Hot	Cold	Hot
Through 1-1/4"	7'-0	CS-CW	CS	CS-CW	CS	CSX-CW	CSX
1-1/2 9'-0	CS-CW	CS	CS-CW	CS	CSX-CW	CSX	
2 - 4 10'-0	CS-CW	CS	CS-CW	CS	CSX-CW	CSX	
6	10'-0	CS-CW	CS	CS-CW	CS	CSXP-CW	CSXP
8	10'-0	CS-CW	CS	CSXP-CW	CSXP	MXP	MXP
10-16 10'-0	CS-CW	CS	MXP	MXP	MXP	MXP	
18	10'-0	NCP	NCP	MXP	MXP	MXP	MXP
20	10'-0	NCP	NCP	MXP(c)	MXP(c)	MXP(b)	MXP(b)
24	9'-0	NCP	NCP	MXP(a)	MXP(a)	MXP(a)	MXP(a)

Notes:

a) 7'-0 maximum spacing
b) 8'-0 maximum spacing
c) 9'-0 maximum spacing

Vertical Pipes: (All Pipe Sizes)

Pipe Riser Clamp Model	Maximum Vertical Centers
PRV	15'-0
HPRC	40'-0

Insulation shall be asbestos-free calcium silicate; 100 psi avg. compressive strength with a K = 0.38 BTU in/ft_2/DegF/Hr. Insulating structural insert shall be asbestos-free calcium silicate; 600 psi avg. compressive strength treated with water repellant.

Jackets shall be galvanized sheet steel ASTM A-527; straps and load distribution plates to be carbon steel ASTM A-36; fasteners to be ASTM A-307, cadmium plated.

GROOVED PIPE COUPLINGS AND VALVES:

Mechanical grooved pipe couplings, fittings, butterfly valves, check valve, and strainers as manufactured by Victaulic or Grinnell Gruvlok, Gustin-Bacon, may be used for piping systems and mechanical equipment connections (in lieu of welded, fanged, threaded connections) in systems specified in all areas except mechanical rooms where all piping shall be rigid type couplings, welded and/or screwed as herein specified under operating conditions not to exceed -30Deg F. through 230deg F. temperature range according to the gasket or valve lining selected and working pressures as shown in the coupling manufacturer's current product specifications, for the following systems (subject to local code approval):

Domestic Hot Water
Domestic Cold Water
Roof Drains

The complete pipe and jointing method shall conform strictly to the manufacturer's requirements for the service designated.

Couplings:

Couplings shall consist of three basic components -- housings, gasket, nuts and bolts.

Branch stub-in connections shall be made with welded stubs. Grooved Mechanical-T shall not be used in lieu of welded stubs.

Fittings shall be of grooved or shouldered and design to accept grooved mechanical couplings without field preparation.

Flanges for connecting fanged components into the grooved system shall be Victaulic Vic-Flanges or Grinnell Gruvlok flanges. Flanges shall conform to 125# cast iron and 150# or 300# steel bolt hole alignment.

Valves:

Valves shall be of grooved end design in sizes 1-1/2" through 12". All butterfly valves 6" and smaller shall be Grinnel Gruvlok Series 7000 butterfly valves or Victaulic Series 703 butterfly valves with long necks and infinitely variable manual handle or manual gear operator, Grade "E" linings and standard trim. All butterfly valves 8" through 12" shall be Grinnell Gruvlok Series 7000 butterfly valves or Victaulic Series 704 Butterfly Valves with

long necks and manual gear operator, Grade "E" linings and standard trim. Operating conditions not to exceed -30 deg to 230 deg temperature. At least one side of each valve shall be joined with a rigid type coupling, Grinnell Gruvlok figure 7009 or 7004 or Victaulic Style 07 or HP-70, to restrain the valve.

Grooved end check valves for horizontal in line service for sizes 2" through 4" shall be Victaulic Series 712 Swinger Swing Check Valve. Grooved end check valves for horizontal and vertical in-line service for sizes 4" through 12" shall be Victaulic Series 711 or 715 which are of non-slam, dual disk design. Check valves are to have Grade "E" linings and standard trim. Grooved end strainers shall be Victaulic Series 730. Grooved end suction diffusers where required by the engineer shall be Victaulic Series 731.

Pipe shall be supplied grooved in accordance with coupling manufacturer's specifications. For grooving on-site, pipe shall be prepared in accordance with the same specifications using specially designed tools available. Pipe ends shall be clean and free from indentations, projections and roll marks in the area from pipe end to groove for proper gasket sealing.

For flexible couplings, the requirements of MSS-SP-69, "Pipe Hangers and Supports - Selection and Application" shall in general, govern the installation of hangers and supports.
In addition, no horizontal pipe shall be left unsupported between any two couplings nor shall any pipe be left unsupported whenever a change in direction of lineflow takes place. Vertical piping shall be supported at every other floor or every other pipe length, whichever is most frequent. The base of the riser or base fitting shall be set on a pedestal or foundation.

For rigid couplings such as Victaulic Styles 07, or HP-70, see manufacturer's current specifications for support.

Three flexible joint grooved couplings in a piping run shall be considered equivalent to a braided bellows for noise and vibration isolation.

PIPE INSTALLATION:

All piping systems shall be installed so that they can be easily drained by means of drainage of low points of all piping without disconnecting pipe. If not specifically indicated on the drawings, the frequency of draining shall determine whether drain caps, plugs, cocks, or valves are to be used. If other than valves are contemplated, the Architect's permission must be obtained.

All installed pipe lines shall be straight, free from dents, scars, and burrs, with ends reamed smooth, and shall remain straight against strains tending to cause distortion during system operation. The Contractor shall make proper allowance for pipe line expansion and contraction so that no unsightly distortion, noise, damage, or improper operation results therefrom.

Piping shall run only parallel or at right angles to the walls or axes of the building and shall be neatly organized. The Contractor shall study the architectural, structural, mechanical, electrical, and other drawings to eliminate conflict of piping with other structure lighting or other services. Unless specified otherwise, no piping shall be exposed in a finished room, except in shop or storage areas. All changes in direction shall be made with fittings.

No piping shall be run above any electrical panels, electrical equipment or access clearances for electrical for electrical panels or equipment. No piping shall be allowed to run through any electrical rooms.

All piping shall be clean and free from acids and loose dirt when installed and shall be kept clean during the completion of the installation.

Plugs of rags, wools, cottons, waste, or similar materials may not be used in plugging. All piping shall be so arranged to not interfere with removal of other equipment or devices; and to not block access to manholes, access openings, etc. Piping shall be arranged to facilitate equipment maintenance. Flanges or unions, as applicable for the type of piping specified, shall be provided in the piping at connections to all items of equipment. Piping shall be placed and installed so that there will be no interference with the installation of the air-conditioning equipment,

ducts, etc. All piping shall be so installed to insure noiseless circulation. All valves and specialties shall be so placed to permit easy operation and access, and all valves shall be regulated and packed, and the glands shall be adjusted at the completion of the work and before final acceptance. All piping shall be erected to insure proper draining. Cooling and heating piping mains may be run level, with traps avoided where possible. Drain valves shall be provided at all low points and manual air vents at all high points in heating and cooling piping. No bushings, short nipples, or street-type fittings shall be used.

Drain valves shall be installed at all low points in all piping systems to allow for complete drainage of piping systems.

When insulated pipes are supported by a roller hanger they shall be protected from damage by suitable pipe covering protection saddles. Saddles shall support pipe on roller and shall be packed with insulation.

Grade:

Soil, waste, and drainage lines shall be graded not less than 1/4 inch fall per foot, unless noted otherwise on the drawings.

Domestic hot and cold water lines shall be graded so that systems can be drained with as few drains as possible. Drains shall be located in convenient and accessible places.

Roof drain lines shall be graded a minimum of 1/8 inch per foot.

Shutoff valves shall be provided in domestic hot and cold water system and in the steam system at each major junction and at each toilet room branch supply line, hot and cold.

Welding:

All welding shall be performed by experienced certified welders. Welders must be certified for the materials, procedures, positions, and applicable codes to be used. Performance qualifications and certifications shall be determined in accordance with Section IX, ASME Boiler and Pressure Vessel Code. All welders must be certified within 3 months of beginning welding on this project. When a welder has not used a specific welding process for a period of 6 months, he shall be required to be requalified before beginning procedure. Welders certificates shall be maintained on file at the project site. Any welding performed by noncertified welders will be rejected.

Electric arc welding shall be used between sections of pipe and between pipe and fittings for black steel piping 2-1/2 inches and larger. All changes in direction of pipes shall be made with welded fittings for sizes 2-1/2 inches and larger. All welds shall be of sound metal, thoroughly fused to the base metal and penetrating to the bottom of the joint.

The strength of the finished weld shall be equal to the strength of the pipe. The width of the finished weld shall be at least 2-1/2 times the thickness of the part joined and the thickness of the weld shall be at least 24 percent greater than the thickness of the pipe or fittings.

No direct welded connections shall be made to valves, strainers, apparatus or related equipment. Connections to fanged valves or accessories having fanged connections shall be made with welded companion flanges.

In general, all fittings shall be standard welding type. Weld-O-Lets may be used on low-pressure lines 2 inches and smaller. Under no circumstances shall pipe be notched, mitered, or swaged.

Screwed Connections:

Piping 2" and smaller shall be screwed. All changes in direction shall be made with standard threaded fittings. Under no conditions will piping be notched, mitered or swaged.

All piping shall be accurately sized to measurements established at the building and worked into place without springing or forcing. Proper provisions shall be made for the expansion and contraction of all pipe lines. Screw joints shall be made with a lubricant applied to the male threads only. Threads shall be full cut and not more than three threads on the pipe shall remain exposed.

All pipe connections to roof drains shall be made with a relatively short riser and a horizontal swing joint so that, as the camber leaves the roof structure, the roof drain will not be forced upward.

Joints in Copper Piping:

Pipe shall be cut square and true. The end shall be deburred, reamed, and/or sized as necessary. The pipe shall be cleaned with medium grit emery cloth and, if the fitting socket is tarnished or shows oxidation, it shall be likewise cleaned. The pipe shall be inserted in the fittings and heat shall be applied to the fittings. Joints in copper piping for all above grade domestic water piping shall be 95/5 or Stay-Safe 50 solder. Solder shall be Silfos or Silverflow for all refrigerant piping joints and any below grade piping. No "Super" fluxes or flux core solders or lead solders shall be used. Only silver shall be used.

An approved isolation fitting shall be installed at the junction of all steel and copper pipes. This shall not apply to copper black steel connections at radiation convectors, cabinet heaters, and coils.

Caulked Joints:

Caulked joints in hub and spigot sanitary soil and vent piping shall be packed firmly with white Oakum Sealite No. 110, or approved equal, and caulked with pure molten lead not less than 1 inch deep. The Contractor may use Ty-Seal or approved equal resilient gasket joints in lieu of lead and Oakum for sanitary soil, waste, and vent piping or hubless cast-iron pipe joint with stainless steel and teflon sleeve and clamp above grade and cast iron M.G. Couplings below grade.

Floor, Wall and Ceiling Plates:

Beaton and Caldwell or Grabler nickel-plated floor, wall, and ceiling plates of adjustable type that can be applied after pipes are in place shall be provided. They shall be installed on all exposed uninsulated pipes passing through walls, floors, and ceilings.

Pipe Sleeves:

All pipes passing through wall, floor, or ceiling construction shall be fitted with sleeves. Each sleeve shall extend through its respective floor, ceiling, or wall and shall be cut flush with each surface except in unfinished areas. Unless otherwise specified, sleeves shall be two pipe sizes larger in diameter than the uninsulated passing pipe. Sleeves in outside walls shall be made of galvanized steel pipe with a water-stop flange.

Sleeves in all finished room floors shall be left flush with floor and caulked watertight around pipe; sleeves in unfinished room floors and under cabinets shall be left standing 2 inches above finished floor. All sleeves are to be caulked watertight with sealing mastic.

All sleeves, except in concrete walls, shall be furnished and installed as work of this Section and installed as work of Division 3, Concrete.

Sleeves for concrete or masonry shall be galvanized steel or cast iron pipe. Sleeves for stud walls shall be 26-gauge galvanized iron. These shall be furnished and installed in close cooperation with the craft involved. These sleeves shall be of sufficient size to readily clear the pipe or pipes and insulation passing through sleeve. Everything more than 6 inches in diameter or groups of multiple piping shall be approved by the Architect.

Bare Pipe: All pipe penetrating fire walls and floors shall be encased in adjustable sheet metal cans sized for maximum one-inch spacing between pipe and can. Spacing shall be packed on either end with UL rated ceramic fiber strip insulation. Pipe Shields, Inc., Model WFB.

Insulated Pipe: Same as for bare pipe, but with the addition of a 360 degree water-proofed calcium silicate insert with metal shielding, all sized to extend to a minimum of one-inch beyond wall or floor. Pipe Shields, Inc., Model WFB-CS-CW for chilled water, and Model WFB-CS for all other insulated lines.

Sleeve and packing shall have the same fire rating as the construction in which they are installed. Any substitutions must have passed the ASTM E-119 test per UBC 43-1 for pipe penetrations.

All holes required for piping through floors or walls, where sleeves have not been installed, shall be core drilled one pipe size larger in diameter than passing pipe.

This Division shall be responsible for the proper sizing and positioning of all necessary boxes and sleeves through walls and floors to accommodate this work.

EXPANSION AND CONTRACTION:

The Contractor shall make all necessary provisions for expansion and contraction of piping with Victaulic couplings, expansion joints, offsets, or expansion loops as required or shown, to prevent undue strain.

ANCHORS AND GUIDES:

All pipes shall be securely anchored where necessary to properly distribute expansion stresses. All vertical risers shall be anchored at the midpoint and at additional locations as required.

Anchors shall be located where indicated by the drawings or required and shall be applicable to the type of piping installed. All anchor bolts, after tightening, shall be welded to the anchor frame in such a manner that all anchor bolts are effective. Additional restraining pipe supports shall be provided wherever danger of excessive pipe movement exists.

Aligning guides of the concentric ring type shall be installed and anchored at all locations where piping may be distorted from the normal centerline movement of the piping and on either side of all expansion joints. Two guides, spaced 3 feet 0 inches on centers shall be provided at each side of the expansion joint or the expansion loop. Job or shop-fabricated guides are not acceptable.

CROSS CONNECTIONS:

No plumbing fixture, device, or piping shall be installed that will provide a cross connection interconnection between a distributing water supply for drinking or domestic purposes and a polluted supply, such as a drainage system or a soil or waste pipe, which will permit or make possible the backflow of sewage polluted water, or waste into the water supply system.

END OF SECTION

SECTION 15400 - PLUMBING SYSTEMS

GENERAL CONDITIONS:

All pertinent sections of Section 15100, Division 15, are a part of the work described in this section. Division 1 is a part of this and all other sections of these specifications.

SCOPE OF WORK:

This work shall include all plumbing fixtures, fixture trim specialties, drains, etc., required for the complete plumbing system.

A complete domestic cold water system and domestic hot water system.

A complete waste and venting system.

Rerouting or capping of any inservice or abandoned utility lines unearthed or uncovered by construction.

Booster system.

RELATED WORK:

Concrete equipment bases for this work are included in Division 3, Concrete. Piping and equipment identification is specified in section 15150. Insulation is specified in Section 15200. Seismic restraints and vibration control is specified in Section 15250. Piping is specified in Section 15300. Special piping systems are specified in Section 15350. Outside utilities are specified in Division 2. Final adjustment or installation of lead pans and drain flashings on roof is included in Division 7, Roofing.

CODES AND STANDARDS:

All work included in the scope of this specification shall conform to the latest adopted versions of applicable codes and standards, including the following:

International Plumbing Code
International Building Code
International Mechanical Code
UOSHA
PDI
ADA

SUBMITTALS:

Submit product data in accordance with Division 1 and Section 15100. Submit the following:

Plumbing Fixtures and Accessories
Water Hammer Arrestors
Pressure Reducing Valves
Gas Pressure Regulators
Water Heaters
Sterilization Contractor
Booster System

TESTS:

Sanitary System: The sanitary soil, waste, vent, and roof drainage piping shall be tested by plugging all outlets and filling the lines with water to the highest roof opening. The water level shall not drop more than 3 inches in 1 hour. All joints within the building shall be inspected for visible leaks.

Water Lines: All water lines shall be tested hydrostatically at 200 psi and shall show a pressure drop not more than 5 psi in a 24-hour period.

Propane Lines: Gas lines shall be tested with air at a pressure of 100 psi and show no drop in pressure. The Gas Company shall test all gas lines for leaks in compliance with Gas Company regulations.

The pressure shall remain on all parts of the system for a minimum of 12 hours to permit complete examination and inspection.

Defective Work: If inspection or tests show defects, such defective work or material shall be replaced or corrected and inspection and tests shall be repeated. All repairs to piping shall be made with new materials. No caulking or screwed joints or holes will be acceptable.

All defects in material and workmanship which appear during the test shall be promptly remedied and the test shall be reapplied.

Enclosed Piping: Any piping which is to be insulated, placed within the construction, or otherwise concealed shall be carefully tested before being permanently enclosed.

Test Instruments: All testing shall be performed in the presence of the Architect and his Mechanical Engineer and shall meet with their approval. Instruments required for making the tests shall be provided by this Contractor. Relief valves set to avoid excessive pressure during testing shall be provided.

Required Adjustments: Before final acceptance of the piping system as a whole, this Contractor shall make all required adjustments, including controls, flush valves, etc., and shall place the entire piping system in a perfect operating condition. At the completion of the work, this Contractor shall furnish the Architect with all certificates of inspection.

GENERAL REQUIREMENTS:

Existing Lines:

Any utility line uncovered during construction that is not clearly defined on the drawings shall be immediately brought to the attention of the Architect and Owner. The Owner and Architect will subsequently inform the Contractor what should be done. A change order shall be initiated in accordance with the General Conditions for such occurrences. Relocation of any existing piping shall be done with the same material and fittings as the original installation. Damaged or removed insulation shall be repaired and/or replaced.

Vents:

The entire system shall be properly vented to atmosphere and all gases shall be discharged at points not less than 14 inches above the roof line. Each fixture shall be back-vented on the discharge side of safe water seal and arranged for free passage of all gases to atmosphere. Vent lines are to be offset, if necessary, so that they will not pierce the roof at points closer than 5 feet 0 inches from the edge of the roof, except where shown otherwise on the drawings.

Cleanouts:

Full size cleanouts shall be installed at the base of each soil waste or rainwater stack and at the end of each horizontal run of sanitary piping. All other cleanouts shall be installed where shown on the drawings and where required by State, local, or National Plumbing Codes.

Cleanouts shall have cast-iron bodies with threaded brass screw plugs. They shall be the full size of the pipe line in which they are installed, up to and including 4 inches. All cleanouts shall be installed in locations easily accessible for rodding. Where stacks or other piping is concealed, cleanouts shall be installed above the floor with extensions made to the finished wall surface. Cleanouts in walls shall be J. R. Smith 4402 with countersunk plugs and round stainless steel access covers. In floors, J. R. Smith 4023 square top cleanouts with countersunk plugs and round scoriated polished nickel bronze access covers with frames shall be used.

Cleanouts shall be J. R. Smith, Zurn, or Josam. J. R. Smith references are used herein.

Traps:

Each fixture and appliance installed in the work and discharging water into the sewer or house drainage system shall have a seal trap arranged in connection with a complete venting system and shall be installed so that all gases shall pass freely to the atmosphere with no pressure or siphon condition on the water seal. Each fixture shall have a water seal of not less than (2) inches and not more than (4) inches except where a deeper seal is found necessary by the Administrative Authority for special conditions.

Flashing and Sleeves:

Furnish and install on each pipe passing through the roof a Stoneman Stormtite four pound seamless lead flashing assembly extending horizontally not less than 12-inches all around. Flashing to have steel reinforced conical boot and counter-flashed with a hooded cast iron counter-flashing. Seal the neck of the flashing to the pipe with permaseal waterproofing compound and secure the counter-flashing to the pipe with vandal proof screws. Fill the top annular space of counter-flashing with epoxy compound. Alternate using open top models of all pipes. See specification Section 15100.

Sleeves for pipes passing through walls, floors or ceilings shall be as specified in Section 15300.

Roof and Floor Pans:

Roof drains and floor drains shall have 4-pound lead sheet pans 40 inches square or as noted. Roof flashing members shall be placed into position but the final installation shall be made by the Roofer under supervision of this section. Floor drains with clamping collars shall be provided to complete the pan installatio.

Burying Pipe:

Outside pipe placed underground is to be buried a minimum of 2 feet to prevent freezing. All backfill shall be mechanically compacted to meet the density requirements set forth in Division 2.

Courses of Water Pipes:
Water pipes shall not be exposed in finished rooms except where noted on plans or as permitted by the Architect, except the finished brass supplies that are a part of the fixture trimmings. Pipes are to be run in tunnel, furred ceiling and walls, and behind or under cabinets as shown.

Sewer Location:

Where the location of the sewer is not clearly defined by dimension on the drawings, it shall not be closer than 10 feet horizontally to a water main or service line, except where the bottom of the water pipe will be at least 12 inches above the top of the sewer pipe, where they shall cross each other at neat 90-degree angles. Verification of existing sewer main elevations shall be made prior to connection or installation of any new lines. Should installation at the minimum required slope be unattainable at the connection points shown, the Architect shall be immediately notified before installation of the line.

Piping Layouts:

Layout of piping shown on drawings is in a general sense diagrammatic as to the exact location of piping. It is to be understood by the Contractor that unforeseen conditions and obstacles at the site may not permit the running of piping as scaled from the drawings, but changes shall not be made without the written permission of the Architect. The Plumbing Contractor shall check toilet room details as shown on the Architectural drawings. He shall check the grade of a waste line with a transit before installing the pipe.

See the Plumbing Fixture Schedule on plans for the sizing of connecting lines to each fixture.

Floor Drains:

Exposed surfaces of floor drains, unless otherwise noted, shall be finished in nickel bronze. Floor waterproofing materials shall be securely anchored in the clamping ring of the floor drain. Floor drain strainers in ceramic tile floors shall be square. The tops of all drains shall be set flush with the finished floor level except where floors are warped to drains, where these shall be set flush. The Contractor shall consult with the trades responsible for adjacent work before establishing final finish elevations. Floor drain location and elevations are to be carefully coordinated to insure they are placed at the low points of the finished floor surfaces. Openings shall be core drilled.

Water Service:

This Contractor shall extend the domestic water line to 5-feet outside the building. Extension of line to main is specified in Division 2.

Waste and Vent System:

A complete plumbing waste and vent system shall be furnished and installed. It shall be installed in strict compliance with the Uniform Plumbing Code. It shall be incorporated into the space constraints in the building.

EQUIPMENT AND INSTALLATION:

Pressure-Reducing Valve (Water):

Direct-Acting PRV:

Single-seated pressure-reducing valves of the sizes and capacities shown on the drawings shall be furnished and installed. Each valve shall be complete with gate valve, strainer, pressure gauge, and union upstream of the valve, and a pressure gauge and gate valve downstream of the valve. A globe valve in a bypass line shall be installed around the reducing station.

Pressure-reducing valves shall be Watson, McDaniel Style B, Charles Bailey, Boylston or Watts.

Vacuum Breakers:

All water outlets with hose ends where backflow is possible and where required by code shall be complete with vacuum breakers. Where vacuum breaker is not specified with fixture trim, the breaker shall be installed in the supply line to the fixture.

Vacuum breakers shall be of chrome-plated brass, or specified finish, and shall be Watts unless otherwise specified. Vacuum breaker shall be in accordance with American Society of Sanitary Engineers (ASSE) Standard 1011 and shall be capable of being drained if located where freezing is possible.

Water Heater

The heater is to be a Tankless Indoor direct water heater. The unit is to have a built in blower with Category III stainless steel vent. The burner shall be a Low Nox burner that meets 1146 requirements. Type "B" Unit is to be Rheem or Takgi.

Water Hammer Arrestors:

J.R. Smith Hydrotrol or Watts water hammer arresters shall be provided in the ends of all multiple flush-valve-type fixture supply lines to eliminate water hammer. Arrestors shall be installed vertically in an accessible location. Shutoff valves shall be installed in lines to all water hammer arrestors.

Water hammer arrestors shall comply with Plumbing and Drainage Institute Standard PDI-WH-201.

Pressure Regulating Valve: (Propane):

A gas-pressure regulator shall be installed on the main gas line to the building to reduce pressure. A gas regulator shall also be provided for each gas-burning appliance if required. The regulator shall be a single-seated cast-iron body gas-pressure-reducing valve where shown on the drawings. The valve shall be installed complete with gas cock and union upstream of the valve and a union downstream of the valve. Gas-pressure-reducing valves shall be Fisher or Rockwell and shall be vented to the outside if inlet pressure is greater than 2 psig.

Access Panels:

Access panels shall be installed over all concealed valves, cleanouts, and any other concealed equipment that may require access for operation, maintenance, and repair. Access box locations shall be verified with the Architect prior to installation.

Tile Walls: J.R. Smith No. 4730 chrome plated
Ceilings: J.R. Smith No. 4760 bonderized and primed.

Booster System

Provide a Tigerflow (or approved equal) Simplex Booster system. The unit is to have a closed coupled pump a pre-pressurized bladder tank, check valve, relief valve, auto pressure switch and comply with OSHA regulations. Motor is to be TEFC with thermal motor overload protection.

STERILIZATION:

After the entire system is completed and tested for pressure, and just before the building is ready to be occupied, this Contractor shall contract with Power Engineering, at contractors expense, to sterilize the system as follows: After the mains are flushed, a water and chlorine solution concentrated to 250 ppm shall be introduced. The treated water and chlorine solution shall be retained for not less than 8 hours before final flushing out of the system until the chlorine content is less than 0.2 PPM.

PLUMBING FIXTURES:

This Contractor shall furnish and install all fixtures shown on the drawings or specified hereinafter, shall make all parts complete, and shall leave the entire system in perfect working order. He shall clean and adjust all fixtures before leaving the job. Any damaged or cracked fixtures shall be replaced at the Contractor's expense.

The fixtures shall be all new and complete as shown or described in catalog or as required for the work. The fixtures shall include accessible loose key compression stops above the floor in supplies to all fixtures and cast brass P-traps unless otherwise shown. Trim for all fixtures shall be chrome plated and all trim shall match in design. All exposed piping in occupied spaces shall be chrome plated. Supply faucets shall have renewable seats and barrels.

Fixtures shall be the water-saver type with maximum usage of 1.6 gallons per flush for flush valve water closets, 1.6 gallons per flush for tank type water closets, 2.4 gallons per minute for showers and 2.2 gallons per minute for lavatories.

All spouts, including gooseneck type, must have a union type connection on the inlet and must be readily convertible from rigid to swing or swing to rigid without disturbing the faucet or fitting body.

Faucet operating handles must be interchangeable.

Faucets shall be Chicago, Zurn, Eljer, or Kohler.

Battery operated sensor faucets shall be Chicago or Sloan.

Stops shall be provided in all water lines to individual sinks, roughed-in locations, etc., as part of the plumbing contract. All fixtures shall be caulked to the floor or a wall with water-resistant white butyl rubber caulking compound.

Fixtures shall be Kohler, Crane, American-Standard, Eljer, or an approved equal. Specialties shall be Zurn, Josam, or J.R. Smith.

Flush valves shall be Sloan or Zurn.

Battery operated flush valves and faucets shall be Sloan or Zurn.

Toilet seat manufacturers shall be Beneke, Church, Lustra, Stasco, Olsenite, or Bemis.

Chair-carriers with floor supports and hangers shall be provided for all wall mounted fixtures. Carrier and wall hydrant manufacturers shall be J.R. Smith, Zurn, or Josam.

Stainless-steel sink manufacturers shall be Just or Elkay.

Electric Water Cooler manufacturers shall be Elkay, Halsey Taylor, Haws, Oasis or Sunroc/Western.

Pressure balance mixing valves shall be Leonard, Symmons.

Thermostatic mixing valves shall be Leonard, Symmons, or Powers.

Water closets shall be the height specified on the Architectural drawings. Water closets shall be supported on Smith 210 or 230 carriers. Where space dictates a smaller carrier, 440 or 417 carriers may be used.

Urinals shall be the height specified on the Architectural drawings. Cleanouts for urinal waste piping in finished walls shall be covered with cleanout assembly and cover as specified elsewhere. Urinals shall be supported with Smith 629, 635, or 637 Carriers.

Supplies and stops shall be Frost, Brasscraft, Kohler, Eastman, U.S. Brass, Robert Mfr. or approved equal. P-traps shall be Frost, Kohler, Sanitary-Dash or approved equal. Grid strainers shall be Chicago or Dearborn.

Electric water coolers shall be the height specified on the Architectural drawings. Coolers shall be hung on an integral mounting frame and receptor hanger furnished with the fountain. Carrier for wall mounted water cooler shall be Smith 830.

Lavatories shall be the height specified on the Architectural drawings. Lavatories shall be supported on Smith 700 or 800 carriers.

Floor drains and floor sinks shall be furnished with clamping collars where a waterproof membrane is provided. Membranes will be required for all drains installed above grade. See architectural drawings for additional locations of membranes.

Trap primers shall serve all floor drains and shall be lavatory tailpiece type or water closet type by PPP or approved manufacturer.

Fixture Schedule:

WC-1 Water Closet (Wall Hung, Flush Valve): American Standard 3402.016 Glenwall pressure assisted, wall hung, vitreous china, 1.6 gallon flush, elongated bowl design, siphon jet flushing, and 2" trapway. Bemis 3155-C Duraguard@ white, solid plastic, open-front seat less cover. Smith 0210 horizontal (left or right hand as required) or Smith 0230 vertical adjustable carrier with floor support. Loose key stop and flexible stainless steel supply. See architectural drawings for mounting height.

U-1 Urinal (Wall Hung, Waterless):Sloan Waterfree WES-2000 waterless urinal, vitreous china, wall hung on hanger brackets included with urinal, with cartridge kit. See architectural interior elevations for mounting height.

L-1 Lavatory (Counter Mount, Sensor Faucet): American Standard 0476.028 Aqualyn countertop sink, 20" x 17" oval, vitreous china, self-rimming lavatory with front overflow and 4" centers drilling. Sloan EBF-650 battery powered sensor faucet with ETF-1024-A 2.2 gpm vandal resistant aerator. Chicago 327A open-grid drain and tailpiece; flexible stainless steel supplies with loose key angle stops, cast brass P-trap with cleanout plug.

S-1 Sink (Wall Mounted, for installation in campground facility only): American Standard 7695.008 Akron 24 x 20-inch, enameled cast-iron, wall mounted with drilled back, 7798.030 3" enameled trap standard with cleanout plug and strainer. Chicago 540LD-244 faucet with 6" spout and self closing cartridge with lever handles. Provide flexible stainless steel supplies with loose key angle stops

SS-1 Service Sink (Floor Mount): Fiat MSB2424 molded stone mop service basin and stainless steel drain. Chicago 897 faucet with vacuum breaker, screwdriver stops in shanks, 5 foot rubber hose and 853 wall hook.

FD-1 Floor Drain: Smith 2005-A-U-CP with 6-inch nickel bronze strainer, deep seal trap and trap primer connection, 2-inch outlet size, cast-iron body, no hub connection.

END OF SECTION

SECTION 15800 - AIR DISTRIBUTION, HEATING AND AIR CONDITIONING

GENERAL CONDITIONS:

All pertinent sections of Section 15100, Division 15, are a part of the work described in this section. Division 1 is a part of this and all other sections of these specifications.

SCOPE OF WORK:

The scope of work shall include all labor, material, and equipment necessary to complete the air distribution, heating and air conditioning work for the entire project, including but not limited to the following:

All ductwork, plenums, sheet metal partitions, and specialties required for the air distribution and ventilating system.

Registers, grilles, louvers, diffusers.

Acoustical lining in ductwork.

Air distribution equipment including exhaust air systems.

Heating units and systems.

Installation of all floor and wall blockouts for floor or wall outlets and coordination with General Contractor during concrete pour.

Substantially complete and accurate adjustment of all equipment of this section, ready for final adjustment as work of Section 15150.

RELATED WORK:

Concrete bases for floor mounted pads are included in Division 3, Concrete. Testing, balancing, and leak testing of ductwork is included in Section 15150. Seismic and vibration control is specified in Section 15250. Electrical work, in general, is included in Division 16.

SUBMITTALS:

Submit product data in accordance with Division 1 and Section 15100. Submit the following:

Registers, Grilles and Diffusers
Exhaust Fans
Duct liner
Flexible duct
Exhaust fans

MATERIALS:

Unless otherwise specified, galvanized iron shall be used throughout, fabricated and installed so that no vibration or noise results. It shall be made from the best grade of galvanized mild steel sheets of the U.S. Standard gauge and shall be free from blisters, slivers, and pits.

All seams shall be hammered and made airtight. The construction of all ductwork, including gauges of metal, bracing layout, etc., shall be in accordance with the following manuals of the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).

Ductwork and plenums shall be in accordance with SMACNA, "HVAC Duct Construction Standards, Metal and Flexible", latest edition.

SHEET METAL GENERAL REQUIREMENTS:

All duct systems shall be constructed to the pressure requirement indicated for the fan serving that duct system. Ductwork systems with a fan pressure requirement less than 2 inches w.g. shall be constructed to meet the requirements of the 2 inch w.g. pressure class. Ductwork on the suction side of the fan shall be constructed to the negative pressure class requirements. Ductwork on the discharge side of the fan shall be constructed to the positive pressure class requirements.

The Contractor shall exercise utmost care to obtain a smooth surface inside of all ductwork, absolutely free from small fins, imperfect joints, or other obstructions that cause noise and increased friction. Any additional duct offsets or turns not shown on plans or increases in length of run necessary to overcome obstacles shall be called to the attention of the Architect so that an acceptable rearrangement can be worked out. Under no circumstances shall the cross section of any duct be decreased by dents, pipes, or hanger rods running through it unless otherwise indicated on the drawings. Neither shall the shape be changed without approval. No quick transitions that restrict the area shall be used. Where necessary to gain clearance, the duct seams may be turned inside. Structural and Architectural drawings shall be consulted for areas with restrictive clearances. This work shall be installed in cooperation with other trades so that there will be no delay in progress of construction work.

During the installation, the open ends of all ducts shall be protected by covering them with plastic sheet tied in place to prevent debris and dirt from entering. It is extremely important that the duct system be clean before finish painting is done.

Duct Joints:

All supply air and exhaust air duct joints, seams and fittings must be sealed airtight as required by the SMACNA Manual table 1-2, seal classification A. All return air ductwork joints shall be sealed as required by SMACNA Manual table 1-2, seal classification C. The term "seal" or "sealed" means use of mastic or mastic plus tape or gasketing as appropriate.

All traverse joints on metal rectangular ducts 30" and over and all exhaust ductwork 12" and larger shall be constructed using the Ductmate 4-bolt duct connection system.

The system must be installed according to the manufacturer's instruction and assembly booklet.

The Ductmate or Ward system shall be comprised of a hollow, slip-on flange, containing a factory applied integral sealant and separate corner pieces to connect the two flanges to form a rectangular frame. This frame shall be affixed to the duct, and bolted together at the corners. Install a gasket between the flanges, and a support cleat to join the flanges on the outside.

The system components shall consist of:

1. flange - 20 ga. roll formed galvanized steel, containing an integral sealant.....
2. corner piece - stamped cold formed galvanized steel, embossed and stiffened.....
3. gasket - closed cell neoprene, 5% max. shrinkage, 5% max. water absorption, self-extinguishing, zero burn rate.....
4. cleat - steel or PVC construction, can be either snapped on, or driven over the joined flanges.....
5. nut and bolt - regular 3/8" x 1" stove bolt, one n/b connects two corner pieces, four n/b per joint.....

Hangers and Supports:

Hangers for ducts up to 18 inches in width shall be placed on not more than 8-foot centers. Ducts 19 inches and over in width shall be supported on not more than 4-foot centers. Hangers shall be placed plumb and shall present a

neat appearance. Duct hangers shall be constructed of galvanized band iron 1 x 1/8 inch for ducts up to 36 inches in width. On ducts 37 inches and more in width, hangers shall be constructed from galvanized angles not less than 1 x 1 inch. The use of perforated band iron for duct support is prohibited. Hangers shall extend down the sides of the ducts not less than 9 inches. On ducts less than 9 inches in depth, hangers shall extend the full depth of the ducts. Attach hangers to the ducts with not less than three rivets or Parker screws of the appropriate sizes. It is essential that all ducts be rigidly supported. Where vertical ducts pass through floors or roofs, a flanged sheet metal collar around the duct shall be welded to the duct, and supporting angles shall be rigidly welded to the duct collars and to the structure. Additional supports shall be provided as required. Angles used shall be galvanized and of sufficient size to support the ductwork rigidly. Horizontal round ductwork shall be supported 6 feet 0 inches o.c. with 2-inch wide bands of 18-gauge galvanized steel wrapped around the duct.

Cross-Breaking:

Sheet metal ducts shall be cross-broken on the four sides of each 4-foot panel. All vertical and horizontal sheet metal barriers, duct offsets, elbows, as well as 4-foot panels of straight sections of ducts or plenum walls, shall be cross-broken. Cross-breaking shall be applied to the sheet metal between the standing seams or reinforcing angles. The center of the cross-break shall be of the required height to assure that the surfaces will be rigid.

All exposed ductwork, other than in mechanical equipment rooms shall have flat seams and joints; standing seams shall not be permitted.

Exposed ductwork shall be run in straight runs; transitions shall occur on one side only with the bottom and exposed edge maintaining an even plane. Ducts shall be wide enough to allow the boot down to the diffuser or grille to be as large as the flange so that the flange will not project out beyond the duct or boot.

Low Pressure Ductwork:

Low pressure ductwork shall mean: All ductwork serving fan systems with a fan static pressure requirement of 2.25 inches w.g. or less, all ductwork downstream of VAV terminal boxes, return air and transfer air ductwork. Ductwork shall be constructed to the SMACNA 2-inch pressure class requirements.

Round Ductwork - Low Pressure:
The round ductwork and accessories shall be factory fabricated, spiral conduit as manufactured by United Sheet Metal Company, Metco, Sheet Metal Products Co., Everdur, Ventline or Dees Spiral Pipe and Fittings. The conduit shall be constructed of rust-resistant zinc-coated steel of the sizes called for on the drawings. Conduit 3 inches to 8 inches in diameter shall be 26-gauge steel, 9 inches to 22 inches in diameter shall be 24-gauge steel, 23 inches through 36 inches in diameter shall be 22-gauge steel, 38 inches through 50 inches shall be 20-gauge steel, 52 inches through 60 inches shall be 18-gauge steel. All conduits up through 60 inches shall be spiral lockseam construction. Conduits over 60 inches shall be 16-gauge steel with longitudinal seam.

All fittings in the round pipe shall be factory fabricated to match the spiral conduit and shall be of the same manufacturer. All elbows and fittings shall be fabricated from galvanized sheets at least one gauge heaver than connecting conduits. Ninety-degree elbows shall be equal to United Sheet Metal Company type E-5, five-piece construction with a centerline radius of 1-1/2 times the pipe diameter. All elbows and fittings shall be constructed in accordance with SMACNA recommendations.

Shop or job fabricating pipe and fittings will not be acceptable.

Pipe-to-pipe joints in diameters to 60 inches are by slip-fit or by projecting collar of the fitting into the pipe.

Insertion length of sleeve coupling and fitting collar is 2 inches for diameters through 9 inches and 4 inches for diameters 10 inches through 60 inches.

Pipe-to-pipe and pipe-to-fitting connections in diameters above 60 inches are made by angle ring flanges. Connections of conduits above 60 inches are made by the loose ring "Van Stone" flange; 1/2 inch flange is provided

for the body ends of duct sections and fittings to act as a gasketing surface for sealing. The angle ring is a rolled welded ring to the following schedule:

Diameter	Size of Angle
37 through 40 inches	1-1/2 x 1-1/2 x 3/16
41 through 48 inches	2 x 2 x 3/16
Over 48 inches	2 x 2 x 1/4

Above 60 inches, the duct and fitting body is to be welded to the angle ring flange. If the duct wall is flanged over the face of the angle ring, the welds can be intermittent welds of 1 inch in 4 inches. If not flanged over face, welding must be continuous. Metal flanging must be 1/2 inch minimum.

Bolt hole spacing for angle rings shall not exceed 6 inches.

If duct sections in diameters greater than 60 inches are supplied in lengths greater than 4-foot lengths, one angle ring must be welded to duct on 4-foot centers. Welding can be intermittent weld of 1 inch in 4 inches.

Round duct joints in diameters through 60 inches shall be assembled and sealed as follows:

Approved sealer equal to "Hard Cast" shall be applied to the coupling and fittings. After the joint is slipped together, sheet metal screws are placed 1/2 inch from the joint bead for mechanical strength. Sealer is then applied to the outside of the joint, extending 1 inch on each side of the joint bead and covering the screw heads. Plastic backed tape is immediately applied over the wet sealer.

The duct sealer must be specifically formulated for the job of sealing the field joints for high-pressure systems. The sealer shall be compatible with plastic-backed duct tape so the two shall cure and bond together. Samples of sealer and tape and the specification data sheets shall be submitted to the Engineer for approval.

Flanged joints shall be sealed by Neoprene Rubber Gaskets.

Closure Collars:

A duct ending at a wall or partition shall have the edge turned back to form a closure collar and flanged tight to the wall or partition so that no sharp or ragged edge appears.

Exposed Round Low-Velocity Duct:

All joints and fittings shall be sealed with thermo-fit duct band by Raychem or approved equal. Contractor shall take care to insure that all joints and fittings are neat in appearance.

Flashing:

Where ducts pierce roof construction, the flashing shall be provided as part of this section and shall be as detailed in the SMACNA manuals. Flashing shall be welded to ducts.

Roof-supported ducts shall be supported from the subroof and supports shall be mopped to the roof and flashed.

The fan bases and duct opening bases on the roof shall be constructed by this Contractor as shown on the drawings. The base shall be constructed to fit the equipment approved for construction. This Contractor shall construct and install a 32-ounce inverted copper pan over the wood bases to act as a counterflashing and weatherproof hood for the base. All openings through the pan for fan mounting shall be sealed weathertight with lead washers. Details are given on the drawings.

Test Holes in Ductwork:

Test holes for testing air quantities in ducts shall be installed at locations to be specified by the Balancing Contractor. Rubber stoppers shall be provided for closing the test holes. Where these holes are installed in insulated ductwork, a removable plug of approved insulation material shall be provided. An instrument port shall be provided as required by the TAB contractor, the Architect or his representative.

Instrument ports shall be die cast with screwed cover for the insulation thickness specified. Ports shall be located outside of the plenum with 20-gauge sheet-metal sleeve of the same size as the port opening, passing through insulation where ducts have interior insulation.

Elbows:

Radius type elbows shall be used wherever possible. Radius elbows shall have a center line radius of at least 1.5 times the duct width. Short radius elbows will not be allowed. Square elbows may be used if they are provided with turning vanes.

Branch Take-offs:

Expanded throat high efficiency takeoffs shall be used for all branch takeoffs unless shown otherwise on the drawings. An opposed blade volume damper with locking quadrant shall be provided at each branch takeoff. Where dampers are not accessible for adjustment from above, concealed ceiling regulators with adjustable chrome-plated covers shall be provided. High efficiency take-offs shall be Hercules or Daniel.
Wall Penetrations:

All ducts penetrating structural or architectural walls shall be sealed air and sound tight as specified in Section 15100, Mechanical General Requirements.

Dimensions:

Ducts, unless otherwise approved, shall conform accurately to the dimensions indicated on the drawings, and shall be straight and smooth on the inside with joints neatly finished. All duct sizes are net free inside dimensions. Acoustically lined ducts shall have outside dimensions increased as required to accommodate the acoustic lining specified and still maintain the free area inside dimensions shown on the drawings.

Field Verification:

No ductwork shall be fabricated without first field verifying that the available space under the actual job conditions will permit installation of the ductwork without structural of other conflicts. This Contractor shall provide all necessary offsets and transitions to make all parts fit without additional compensation.

Duct Cleaning:

Before ducts are insulated and before the ceiling is installed and final connections made to the terminal boxes, the fans shall be operated at full capacity to blow out any dirt and debris from the ducts. The full capacity of the fan shall discharge into the duct. If it is not practical to use the main supply blower for this cleaning, the ducts may be blown out in sections by a portable fan. After the ducts have been cleaned and initially pressure tested, the final connection shall be made to the terminal boxes.

SHEET METAL SPECIALTIES:

Flexible Connections:

This Contractor shall provide flexible connections not less than 4 inches wide, constructed of heavy, waterproof, woven plastic-coated glass fabric at the inlet and outlet connections or each fan unit, securely fastened to the unit

and to the ductwork by a galvanized iron band, and provided with tightening screws. Corners shall be sewn tight shut. The connection shall be 20-ounce Ventfab.

Volume Dampers:

Opposed-blade balancing dampers (OBD) to 12 inches by 36 inches: Dampers used in low-velocity branch ducts to control the volume or air flow shall be Young No. 817 volume control dampers. An operating head shall be placed on the side of the duct and shall be locked in position by a set key where the damper is accessible. Where the damper is not accessible, Young No. 817A or 817B volume control damper, consisting of an end bearing or miter gear, coupling, 3/8-inch square shaft, and a 31 x 3/8 inch regulator for operating the unit from suspended ceiling shall be provided.

Opposed-blade balancing dampers (OBD) larger than 12 inches by 36 inches: (Air Balance type AC2) opposed-blade damper of 14-gauge galvanized steel with locking quadrant shall be used or Ruskin, Louvers and Dampers, Daniel, United Air, or Safe Air.

Damper Regulators:

All volume dampers and splitter dampers in exposed ductwork shall be provided with Ventlock No. 640 or Young No. 443 damper regulators. Each volume damper and splitter damper concealed above an inaccessible ceiling, etc., shall be provided with a shaft extended through the ceiling, to which shall be attached a chrome-plated Ventlock No. 666 concealed damper regulator. No. 680 Ventlock miter gears shall be used where necessary.

Belt Guards:

Belt guards shall be fabricated and installed. Guards shall be constructed of 10-gauge wire, 1-inch mesh in 1-1/2-inch angle-iron welded frames. All guards shall be provided with an opening for a tachometer and shall be either the split type or easily removable for belt repair. The guards shall be anchored securely to the floor or walls to prevent any vibration.

Turning Vanes:

Turning vanes shall be furnished and installed in all 90-degree turns in all supply, return, mixed and fresh air ducts, and elsewhere as shown on the drawings. Install turning vanes in all exhaust ductwork except grease hood exhaust ductwork. Material of turning vanes shall match ductwork. Vanes are to be single blade, of size, spacing, gauge, and fabrication in accordance with SMACNA recommendations.

Ducts at Masonry:

Where ducts are shown connecting to masonry openings along edges of all plenums at floors and walls, a continuous 2 x 2 x 3/8-inch galvanized angle iron shall be provided. The angle iron shall be bolted to the construction and made airtight to the construction with caulking compound. Sheet metal at these locations shall be bolted to the angle irons.

V-Belt Drives:

V-belt drives of canvas and rubber construction of approved manufacturer shall be provided for all fans. V-belt drives shall have matched belts adjusted to drive the apparatus properly and to prevent slippage and undue wear in starting. Drives shall be designed for 150 percent of the specified motor nameplate rating. Drives for fans shall be Browning and Woods or an approved equal. Complete data on all drives must be submitted for approval. Drives must provide for the fan operating at midrange when at specified performance. At the completion of balancing, each drive shall be checked, and, if the fan is not operating near midrange, the V-belt drive shall be replaced with a suitable drive. Provide only "A", "B", or "C" Section drives. "3V" and "5V" are not acceptable. Provide variable pitch on all drives up to and including 10 hp. Larger horsepower drives shall be provided with fixed pitch sheaves

and changed as necessary by the balancing Contractor. The cost of the new sheaves shall be borne by the Fan Manufacturer.

Drip Pans:

Drip pans soldered watertight shall be provided at all cooling coils with drains extended to the nearest floor drain or roof with a P-trap.

Duct Insulation:

All rectangular low-pressure supply air, return air, mixed air, and fresh air ducts shall be lined with 1 inch of fiberglass insulation securely butted or lapped and sealed. Insulation shall be Manville Permacote Linacoustic or equal of Certainteed or Knauf. Liner shall have 1-1/2 pound density with flame spread rating of 0-25 and smoke of 0-50. Duct liner shall have an NRC rating of not less than 0.60 and a thermal conductivity (k factor) of not more than 0.27 BTUH/In-ft^2. **Duct Liner shall have factory applied edge coating.** Duct dimensions shall be increased 2 inches on each side from those shown on drawings to accommodate insulation. Insulation shall be attached with Graham pins or stick slips applied not less than one for each 2 square feet of insulation. The insulation shall be applied to the sheet metal with a fire-retardant mastic on not less than 50 percent of the surface. The insulation shall be further held in place with mechanical fasteners spaced on not greater than 1-foot 0-inch centers. Side pieces of the duct lines shall be cut to lap inside the top and bottom pieces. All interior joints shall be painted to a smooth surface and all edges shall be coated with a fire-resistant mastic prior to being delivered to job site. Any duct sections found with uncoated edges will be rejected. The tops of all fasteners shall be coated with the same mastic.

INSTALLATION CHECK:

See Section 15100, paragraph "Installation Check".

EQUIPMENT:

Roof Curb:

All roof curbs for rooftop equipment shall be minimum of 12" high. They shall be custom manufactured to provide a level base for the equipment. Roof curbs shall be provided by Division 15 unless noted otherwise.

Registers, Grilles, and Diffusers:

Registers, grilles, and diffusers of the sizes shown on the drawing and described herein shall be furnished and installed. All grilles, diffusers, and registers shall be complete with frames with rubber gaskets suitable for the area and wall construction where shown on the drawings.

Finish for all registers, diffusers, grilles, etc., shall be off-white unless otherwise selected by the Architect. The successful supplier shall submit color samples to the Architect for his selections before the order is placed. All data shall be certified, and all tests shall be performed in accordance with the requirements of the Air Diffusion Council. For convenience and to establish quality and function, manufacturers and their model numbers are used herein and on the drawings. Items for air distribution shall be Titus, Nailor, Metal Air, Tuttle & Bailey, J&J, Anemostat, or E.H. Price.

a. Ceiling supply air diffusers shall be louvered faced Titus TDC, with border type 3 for lay-in ceilings or border type 6 for surface mounting in other than lay in ceilings, baked enamel finish for blow and pattern shown on drawings.

b. Ceiling return-air grilles in lay-in ceiling shall be Titus PAR-3, with removable perforated faceplate for lay-in T-bar application, baked enamel finish.

c. Ceiling return-air grilles in other than lay-in ceiling shall be Titus 8F with perforated faceplate, baked enamel finish.

d. Exhaust-air registers in lay-in T-bar ceiling shall be Titus PAR-3 with removable perforated faceplate and baked enamel finish.

e. Exhaust-air registers in other than lay-in ceilings shall be Titus 355FL or 355FS with 40-degree deflection horizontal extruded aluminum blades with baked enamel finish. Exhaust registers from lower than 6 feet 0 inches above floor shall be sight-proof, heavy-duty gymnasium type equal to Titus 33RL or 33RS with horizontal 40-degree deflection blades, baked enamel finish.

Ceiling diffusers may be square necked (as shown on drawing) or equivalent size round neck. Flex duct may connect directly to diffuser (provide a square neck to round neck adapter as necessary). Provide a 1-1/2 radius elbow to avoid kinking duct (see detail). If a 1-1/2 radius elbow cannot be provided, then a lined sheet metal boot shall be provided (see detail).

Ceiling diffusers grilles and registers shall be independently supported from the structure so that they are not depending on ceiling for support.

Vents and Stack:

Vents for natural draft hot water heaters, unit heater, furnaces and other gas burning appliances shall be Class B Metal Bestos aluminum construction with a cleanout plug. A draft proof raincap shall be provided.

Flexible Duct (Low Pressure):

Flexible duct connections from the main trunk ducts to diffuser boots shall be furnished and installed as shown on the drawings. Flexible duct shall be used for supply air ducts only. Flexible ducts shall contain a full inner liner, 1 inch of insulation, vapor barrier, and compression fittings on both ends. Flexible ducts shall connect to trunk duct using high efficiency take offs. A balance damper with locking quadrant will be provided downstream of take-off from trunk duct. Maximum length of flexible duct is 10 feet. Flexible ducts shall be Genflex SLR-25 or Wiremold, Flexmaster, Cody, West or Hercules. Flex duct shall be secured using plastic cinch ties.

Ducts shall conform to the requirements for Class I connectors when tested in accordance with "Standard for Factory Made Air Ducts Materials and Air Duct Connectors" (UL 181). Ducts shall also pass the 15 minute U.L. flame penetration test as specified in the UL 181 Standard.

Square Centrifugal Blower

Fan shall be duct mounted, belt driven centrifugal square inline.

Fan shall be manufactured at an ISO 9001 certified facility. Fan shall be listed by Underwriters Laboratories (UL 705) and UL listed for Canada (cUL 705). Fan shall bear the AMCA certified ratings seal for sound and air performance.

The fan shall be of bolted construction utilizing corrosion resistant fasteners. Housing shall be minimum 18 gauge galvanized steel with integral duct collars. Bolted access doors shall be provided on three sides, sealed with closed cell neoprene gasketing. Pivoting motor plate shall utilize threaded L-bolt design for positive belt tensioning. Housing shall be pre-drilled to accommodate universal mounting feet for vertical or horizontal installation. Unit shall bear an engraved aluminum nameplate and shall be shipped in ISTA certified transit tested packaging.

Wheel shall be centrifugal backward inclined, constructed of 100% aluminum, including a precision machined cast aluminum hub. Wheel inlet shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA Standard 204-96, *Balance Quality and Vibration Levels for Fans.*

Motor shall be heavy duty type with permanently lubricated sealed ball bearings and furnished at the specified voltage, phase and enclosure.

Bearings shall be designed and individually tested specifically for use in air handling applications. Construction shall be heavy duty regreasable ball type in a pillow block cast iron housing selected for a minimumL50 life in excess of 200,000 hours at maximum cataloged operating speed.

Belts shall be oil and heat resistant, non-static type. Drives shall be precision machined cast iron type, keyed and securely attached to the wheel and motor shafts. Drives shall be sized for 150% of the installed motor horsepower. The variable pitch motor drive must be factory set to the specified fan RPM.

Fan shall be model SQN-B as manufactured by
Acme, Penn and Cook.

Inline Duct Blower

Fan shall be duct mounted, belt driven centrifugal cabinet fan with external motor mount.

Fan shall be manufactured at an ISO 9001 certified facility. Fan shall be listed by Underwriters Laboratories (UL 705) and UL listed for Canada (cUL 705). Fan shall bear the AMCA certified ratings seal for sound and air performance.

The fan shall be of bolted construction utilizing corrosion resistant fasteners. Housing shall be minimum 18 gauge galvanized steel with two access doors and integral duct collars. Internal blower assembly shall be mounted on rubber vibration isolators. Motor shall be out of the air stream. Hanging brackets shall be provided for horizontal installation. Unit shall bear an engraved aluminum nameplate and shall be shipped in ISTA certified transit tested packaging.

Wheel shall be DWDI centrifugal forward curved type, constructed of painted steel. Wheel shall be balanced in accordance with AMCA Standard 204-96, *Balance Quality and Vibration Levels for Fans.*

Motor shall be heavy duty type with permanently lubricated sealed ball bearings and furnished at the specified voltage and phase.

Bearings shall be permanently lubricated, sealed ball type selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed.

Belts shall be oil and heat resistant, non-static type. Drives shall be precision machined cast iron type, keyed and securely attached to the wheel and motor shafts. Drives shall be sized for 150% of the installed motor horsepower. The variable pitch motor drive must be factory set to the specified fan RPM.

Fan shall be model DBX as manufactured by
Acme, Cook, and Penn.

Radiant Wall Heater

The unti shall be a Vent-Free Propane heater. The heater is to be Thermostatically controlled. The unit shall have modulation. Proved mounting brackets as required and fans if scheduled. Color shall be selected by the Architect. Unit shall be by Empier or Williams. Provide

END OF SECTION

SECTION 15900 - AUTOMATIC TEMPERATURE CONTROL SYSTEM

GENERAL CONDITIONS:

All pertinent sections of Section 15A, Division 15, are a part of the work described in this section. Division 1 is a part of this and all other sections of these specifications.

SCOPE OF WORK:

The scope of work shall include all labor, material, and equipment necessary to complete the temperature control work for the new addition.

This system shall include but not be limited to controls and equipment as hereinafter specified:

Exhaust Fans
Unit Heaters
Propane Leak Detectors
Etc.

The Contractor shall carefully review all notes, coordination schedules, and drawings for work required under this section of the specification.

Provide test equipment. Install and monitor as described under "Test Run", Section 15100.

SUBMITTALS:

Prior to any installation, the Contractor shall submit, within 30 days after award of contract, a complete submittal. This submittal shall contain six (6) copies of complete literature on all control equipment including control diagrams.

TESTS:

The automatic temperature control contractor shall furnish a technician familiar with the control system to the testing and balancing contractor to verify the operation of the control system components. Refer to the Test and Balancing Section of Div. 15.

ELECTRICAL WIRING:

All power wiring of fans and all other heating and ventilating equipment shall be furnished by the Electrical Contractor. The ATC Contractor is responsible for all control wiring not shown on electrical drawings or specified elsewhere in connection with the automatic temperature control system. All temperature control wiring shall be installed in conduit as required by the National Electric Code and local codes. In addition, all exposed wiring, wiring in walls, and wiring run in non accessible areas shall be run in conduit.

EQUIPMENT:

Thermostats:

Thermostats shall be low voltage type with concealed adjustment with tamper proof cover for public areas. Thermostats for sleeping rooms shall have exposed adjustment with temperature indication. Thermostats shall be adjusted under operating conditions. Electrical rating shall be a minimum of 20 percent greater than the load being controlled. Provide insulating base where thermostat is mounted on exterior walls.

Thermostats shall be installed and wired by this contractor. Mount all thermostats at 60" above finished floor unless noted or directed otherwise. Coordinate exact thermostat with architectural room elevation prior to locating. Any discrepancies or conflicts discovered during this coordination are to be immediately brought to the architect's attention before proceeding.

Miscellaneous:

The control manufacturer shall furnish all two-position relays, capacity relays, plus all other controls necessary to meet the specifications and to provide for a properly operating automatic control system. All switches and relays must be UL listed and must meet current and voltage requirements of the particular application. Pressure-electric switches used on large span signals such as sensor outputs shall be precision setpoint type with fixed differential not to exceed 0.5 psig.

Labels:

All controls except individual room controls shall be permanently labeled with an identification number keyed to the control diagrams. Labels shall be mounted adjacent to the device such that if the device is replaced, the label remains intact. This applies to both field and panel mounted controls.

SEQUENCE OF CONTROL:

Heating:

The radiant heating units are to have a wall mounted thermostat.

Exhaust Fans:

These fans shall run continuously whenever their control switch is in the on position.

is below 70 deg F providing the building is in the occupied summer mode.

Propane Monitor:

A propane monitor in each mechanical room shall monitor and sound alarm bell if a propane leak is found.

END OF SECTION

SECTION 16000 - GENERAL PROVISIONS, ELECTRICAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions and Division 1 Specification Sections apply to work of this section and all other Division 16 specification sections.

B. This section applies to all Division 16 specification sections.

1.02 SUMMARY

A. This section includes general administrative and procedural requirements for electrical installations to expand the requirements of the General Conditions and Division 1 Specification Sections.

1.03 STANDARDS

A. The following industry standards are considered minimum requirements for electrical work and are made a part of the contract documents:

1. National Electrical Code, 2005 Edition (NEC)
2. Electrical Ordinances of Local Governing Authority
3. Utah State Fire Marshal's Rules and Regulations
4. International Building Code
5. International Fire Code
6. Underwriters Laboratories (UL) Standards
7. American National Standards Institute (ANSI)
8. National Electrical Manufacturer's Association (NEMA)
9. National Fire Protection Association (NFPA) Standards
10. Regulations of American Standards Association
11. Power Company rules governing installation of electrical service.

B. If any conflict occurs between these rules and the contract documents or between the plans and specifications, notify the Architect promptly in writing. Do not proceed with any work in conflict until a solution is approved in writing by the Architect.

1.04 WORKMANSHIP

A. All Electrical Work of any nature shall be performed by qualified electricians, experienced in the type of work to be performed and licensed with the State of Utah. Electricians shall show their license upon request of the Owner, Architect and/or their representatives.

1.05 FEES AND PERMITS

A. Obtain all necessary fees, permits and inspections in accordance with the General Conditions and Division 1 Specifications. Coordinate requirements with the General Contractor.

B. Include One Hundred Dollar ($100.00) fee for installation of underground electrical service, payable to Utah Power.

1.06 ELECTRICAL WORK INCLUDED

A. The basic contract work includes all labor, material, tools, transportation, equipment, and superintendence specified, indicated on the drawings or necessary to make a complete installation of, but not limited to, the following:

1. Appliances, apparatus and materials not specifically noted on drawings or mentioned herein, but which are necessary to make a complete working installation of all electrical systems required for the project.

2. Hangers, anchors, sleeves, chases, supports and fittings as may be required and as indicated.

3. Complete electric service with service conduits, service conductors, main distribution panel, distribution system, branch panels and branch circuits for power and lighting with raceway system and outlet boxes.

4. All luminaries, wall switches, receptacles, etc. as indicated on drawings.

5. Exterior building lighting and controls.

6. Electrical service to heating, ventilating and air conditioning equipment.

7. Safety switches and other wiring necessary to connect electric power to the controls of heating, ventilating and air conditioning equipment.

1.07 SUBSTITUTIONS

A. Material or products specified by name of manufacturer, brand or trade name or catalogue reference will be the basis of the bid and furnished under the contract unless changed in writing by the Architect. Where two or more materials are named, the choice of these will be optional with the Contractor.

B. Submit requests for substitution in writing to the Architect, with copy to the Engineer, in accordance with the General Conditions.

1.08 ACCURACY OF DATA

A. Data given herein and on the drawings are as exact as could be secured, but their absolute accuracy is not guaranteed. Specifications and drawings are for the assistance and guidance of the Contractor.

B. Electrical drawings are diagrammatic, but will be followed as closely as actual building construction and work of other contractors will permit. All deviations from the drawings required to make the Electrical Work conform to the building as constructed and to the work of other contractors will be made by the Contractor as approved by the Architect.

1.09 VISIT THE SITE

A. Contractors are assumed to have visited the site and thoroughly acquainted themselves with conditions affecting the proposed work. Verify existing conditions and measurements at the building before beginning work and immediately notify the Architect of any discrepancies.

1.10 TEMPORARY POWER

A. Provide temporary power for reasonable convenience during construction in accordance with the General Conditions.

B. Provide GFCI Protection for all temporary power outlets.

C. Use temporary power for construction purposes only. Do not use temporary power for electric space heating, etc..

1.11 SHOP DRAWING SUBMITTALS

A. As soon as possible after contract award, submit shop drawings for review in accordance with the General Conditions and Division 1 Specifications.

B. Submit shop drawings in three ring loose-leaf binder.

C. Divide Electrical equipment into subsections of common equipment such as wiring devices, lighting fixtures, panelboards, starters, etc.. Provide a complete equipment list at the beginning of each subsection.

D. Provide manufacturers' catalogue and/or descriptive literature indicating specific model and/or catalog numbers, options, accessories and modifications for the following items:

1. Wiring Devices
2. Safety Switches
3. Panelboards
4. Motor Starters
5. Light Fixtures

E. Above list is considered minimum. Additional items may be required to be submitted for review.

F. Refer to individual Specification Sections for additional Shop Drawing Submittal requirements.

1.12 RECORD DRAWINGS

A. Provide As-Built Record Drawings in accordance with the General Conditions and Division 1 Specifications.

B. Indicate location and routing of all underground raceways on the As-Built Record Drawings by dimension to permanent structures such as buildings, sidewalks, curbs, etc.

C. Indicate all changes made to the drawings such as changes in fixture and outlet location, changes in circuit routing and circuit numbering, etc. Include all changes by Addenda, Change Order, Supplemental Instruction or verbal instruction.

D. Refer to individual Specification Sections for additional Record Drawing requirements.

1.13 OPERATION AND MAINTENANCE MANUALS

A. Provide Operation and Maintenance Manuals in accordance with the General Conditions and Division 1 Specifications.

B. Include manufacturers' catalog and/or descriptive literature of equipment actually installed. Clearly indicate

on literature the specific model and/or catalog numbers of equipment installed, including all options, accessories and/or modifications.

C. All copies of literature will be new, clean and clearly legible. Sheets used for shop drawing submittals with review stamp, remarks, etc., will not be acceptable.

D. Divide Electrical equipment into subsections of common equipment such as wiring devices, lighting fixtures, panelboards, starters, etc.. Provide a complete equipment list and recommended maintenance schedule at the beginning of each subsection.

E. Refer to individual Specification Sections for additional Operation and Maintenance Manual requirements.

1.14 WARRANTY

A. Provide Warranty for Electrical Work in accordance with the General Conditions and Division 1 Specifications.

B. Provide manufacturer's warranty for all equipment which the manufacturer normally provides a warranty in excess of twelve months. Refer to individual Specification Sections for extended warranty requirements.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All materials and equipment for which U.L. Standards have been established, will be listed by and bear the label of Underwriters Laboratories, Inc..

B. All materials will be new and bear the manufacturer's name, trade name and catalog or model numbers. Similar items will be of the same manufacturer.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation of materials will comply with all codes and be accomplished with good workmanship in the judgement of the Architect and Engineer.

3.02 COOPERATION WITH OTHER CONTRACTORS

A. Cooperate with other contractors doing work on the building as may be necessary for the proper execution of the work of various trades employed in construction of the building.

B. Refer to architectural, structural and mechanical drawings, for construction details, and coordinate the electrical work with that of other contractors to the end that unnecessary delays and conflicts will be avoided.

3.03 MATERIAL HANDLING

A. Use all means necessary to protect materials before, during and after installation and to protect the installed work and materials of all other trades.

B. 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.

3.04 CUTTING AND REPAIRING

A. Provide all required digging, cutting, etc. incidental to the Electrical Work. Make required repairs thereafter to the satisfaction of the Architect.

B. Do not cut into any major structural element, beam or column, without written approval of the Architect.

C. Install the Electrical Work to proceed with other trades in order to avoid unnecessary cutting of the construction.

D. Perform all excavating, trenching and backfill required for electrical work in accordance with Division 2 Specifications.

3.05 CONSTRUCTION REVIEW

A. The Owner, Architect and/or Engineer will perform construction review throughout the construction of the project. The construction review does not relieve the contractor from the responsibility of providing all materials and performing the work in accordance with the Contract Documents.

B. Notify the Architect in writing, giving ample notice, at the following stages of construction and allow the Owner, Architect and/or Engineer to review the installed work.

1. When underground electrical work is complete, before backfilling, including work under floor slabs.
2. When all electrical rough-in is complete, but not covered.
3. Pre-Final, upon completion of all electrical work.
4. Final, upon completion of all items noted in the Pre-Final Construction Review Report.

C. Prerequisite for Final Electrical Construction Review:

1. Electrical Engineer/Consultant must be present.
2. Electrical Contractor's job foreman must be present.
3. DFCM Electrical Specialist must be present.
4. Service Disconnect and all Panelboard Enclosures must be open.
5. Clear access must be provided to all devices and equipment.
6. All panels, disconnects, etc. must be labeled and typed panel index cards installed.
7. All light fixtures, outlets, etc. must be energized and operable.
8. Contractor must have pad and pencil to list all deficient items.
9. Make all corrections and adjustments after the Final Construction Review, not during. Items requiring correction will appear on the Final Construction Field Report.
10. Contractor must have all required keys to provide access to all panels and doors.

D. Test all systems and equipment provided and/or connected under the Contract for short circuits, ground faults, proper neutral connections and proper operation in the presence of the Owner, Architect and/or Engineer.

E. The entire construction will be installed in accordance with the contract documents and be free of mechanical and electrical defects prior to final acceptance of the work.

END OF SECTION 16000

Dead Horse Point State Park
New Restroom Facilities
Division of Facilities Construction Management

SECTION 16110 - RACEWAYS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.02 SCOPE

A. Provide a complete raceway system for all wiring as shown on the drawings and as specified herein.

PART 2 - PRODUCTS

2.01 RACEWAYS

A. Provide minimum 3/4" trade diameter raceways for all wiring systems.

1. Minimum 1/2" trade diameter raceways may be used for remote control, signaling and power-limited circuits which meet the requirements of National Electrical Code Article 725 as allowed in other Specification Sections and/or as approved by the Architect.

B. Do not use aluminum conduit, intermediate steel conduit (IMC), BX cable, MC cable, Flexible Non-metallic Tubing, NM cable, Direct Burial Cable or any other wiring methods not allowed by this specification unless approved in writing by the Architect and/or Engineer.

2.02 ABOVEGROUND RACEWAYS

A. Provide Electrical Metallic Tubing (EMT), galvanized inside and out, for raceways not subject to permanent moisture or damage.

B. Provide Galvanized Rigid Steel Conduit (GRC) where raceways are subject to permanent moisture such as underground, or damage such as vehicular traffic, etc..

2.03 UNDERGROUND RACEWAYS

A. Provide Schedule 40 PVC electrical conduit in earth or in concrete in contact with earth.

1. Provide a separate ground wire in all PVC conduits, except main electrical service conduits.

2. Provide Galvanized Rigid Steel Conduit (GRC) for all bends greater than 22 degrees in PVC conduits.

3. Do not use PVC conduit above grade nor for penetrations through structural elements such as foundation walls, floor slabs, etc..

B. Provide Galvanized Rigid Steel Conduit (GRC) for conduit penetrations through floor slab or grade to extend minimum 12" above floor or grade.

C. Provide Galvanized Rigid Steel Conduit (GRC) for conduit penetrations through foundation walls to extend minimum 36" beyond the foundation wall.

D. Corrosion protect all galvanized rigid steel conduit (GRC) installed in earth or in concrete in contact with earth with two (2) half-lapped layers of 0.010" thick approved waterproof PVC tape equal to Scotch No. 50 or use factory PVC coated rigid steel conduit with all field joints coated after installation.

2.04 FLEXIBLE RACEWAY CONNECTIONS

A. Provide Flexible Steel Conduit for final connection to lay-in light fixtures, motors and other equipment subject to vibrations or movement, not to exceed 6 feet for fixture connections and 3 feet for motor and equipment connections.

B. Provide liquid-tight flexible steel conduit outside and in wet, humid, corrosive and oily locations.

1. Provide Sunlight Resistant liquid-tight flexible steel conduit outdoors.

C. Provide a ground conductor in all flexible steel conduit.

D. Flexible Steel Conduit may be used where misalignment or cramped quarters exist only with prior approval of the Architect and/or Engineer.

2.05 CONDUIT FITTINGS

A. Provide steel compression type or steel set screw type fittings for Electrical Metallic Tubing.

B. Provide malleable iron clamp type fittings for Flexible Steel Conduit.

C. Provide steel compression type fittings for Liquid-Tight Flexible Steel Conduit.

D. Provide threaded fittings for GRC conduit. Provide double locknuts and plastic bushing for GRC conduit terminations or provide boxes and enclosures with threaded hubs.

E. Provide liquid-tight and gas-tight conduit fittings underground using fittings and PVC cement as recommended by the conduit manufacturer.

F. Provide steel rain-tight, compression type fittings for all conduit installed outside and in wet, humid, corrosive and oily locations.

G. Provide Insulated Throat Connectors for all conduit terminations 1" diameter and smaller. Provide insulating bushings for all conduit terminations 1-1/4" diameter and larger.

H. Provide Grounding Bushings bonded to the electrical system ground:

1. On each end of all service conduits.

2. On each end of all feeder conduits in which a separate ground conductor is installed.

3. On each end of all conduits used to protect ground conductors.

4. On all conduit terminations installed in concentric or eccentric knockouts or where reducing washers have been installed.

I. Do not use cast metal or indenter type fittings. Do not use screw-in type fittings for Flexible Steel Conduit.

Do not use spray (aerosol) PVC cement.

2.06 RACEWAY SEALS

A. Seal all conduit penetrations through fire rated walls, ceilings and floors with a UL classified fire barrier system as manufactured by Scotch 3M or Nelson Electric which will provide an immediate fire seal, require no curing time, and emit no hazardous or toxic fumes.

B. Seal all conduit penetrations through airtight spaces and plenums with an approved mastic compound acceptable to the Architect to prevent air leakage.

2.07 ROOF PENETRATIONS

A. Provide Galvanized Steel or Lead roof jacks of suitable style and material for all conduit penetrations through roof to provide a weathertight seal in accordance with the applicable Roofing Specification Sections. Coordinate style, material and installation with the roofing contractor.

2.08 PULL BOXES

A. Provide pull boxes or conduit bodies in accessible locations where required to reduce the number of bends in the conduit run to less than 360 degrees and at points not exceeding 100 feet in long branch circuit conduit runs.

1. Indicate exact location of pull boxes and conduit bodies on the As-Built Record Drawings.

2.09 PULL STRING

A. Provide a nylon or polypropylene pull string with not less than 200 lb tensile strength in all spare conduits and conduits installed for use by others. Provide a hard cardboard tag for each raceway to indicate location of the opposite end of the raceway.

PART 3 - EXECUTION

3.01 SUPPORTS

A. Securely support all raceways with full pipe straps, hangers, or ceiling trapeze directly from building structure such as roof trusses, beams, floor joists, etc., in accordance with Specification Section 16190 - Supporting Devices.

1. Do not support raceways from other electrical systems or mechanical systems.

B. Provide supports at 5'-0" on center with a minimum of two supports for each ten foot length of conduit or fraction thereof up to 6 feet.

C. Provide a support within 12" of each coupling, fitting, box, enclosure and bend.

1. Install supports at vertical to horizontal conduit bends on the upper side of the bend.

3.02 INSTALLATION

A. Raceway layouts on the drawings are generally diagrammatic and the exact routing of raceways will be governed by structural conditions and the work of other contractors.

B. Install raceways concealed within finished ceilings, walls and floors except where exposed raceways are specifically shown on the drawings or permitted by the Architect.

C. Install exposed raceways parallel with or perpendicular to walls and ceilings, with right angle turns consisting of symmetrical bends or conduit bodies equal to Crouse-Hinds "Condulet". Avoid all bends and offsets where possible.

1. Paint exposed raceways to match surrounding surfaces, except raceways in unfinished areas such as mechanical rooms and electrical rooms will not be required to be painted.

D. Install raceways minimum 12" from insulation of hot water piping, steam piping and other systems or equipment with temperatures in excess of 104^0 F (40^0 C).

E. Make all field bends and offsets with a radius not less than allowed by the National Electrical Code for the type of raceway system.

1. Do not install bends or offsets which are flattened, kinked, rippled or which destroy the smooth internal bore or surface of the conduit.

F. Cap the open ends of raceways during construction to prevent the accumulation of water, dirt or concrete in the raceways. Thoroughly clean raceways in which water or other foreign matter has been permitted to accumulate or replace the raceway where such accumulation cannot be removed by a method approved by the Architect and/or Engineer.

G. Install raceways for parallel feeder conductors with the same physical characteristics and in exactly the same manner. Maintain spacing between raceways for entire run.

H. Do not install raceways which have been crushed or deformed in any manner.

I. Do not install wiring until work which might cause damage to the wires or raceways has been completed.

3.03 UNDERGROUND RACEWAY INSTALLATION

A. Install underground raceways within buildings minimum 4" below the bottom of the concrete floor slab to the top of the raceway.

B. Install underground raceways outside of building minimum 24" below finished grade to the top of the raceway.

1. Provide a plastic red magnetic warning ribbon stating "CAUTION - BURIED ELECTRICAL" 12" directly above the top of the raceway.

C. Use select granular fill, free of rocks or hard clumps with sharp or angular edges, for the first 6" of backfill around underground raceways including raceways below concrete floor slabs. Provide imported sand backfill where required by Division 2 Specifications or where excavated materials are not suitable.

D. Coordinate location of underground raceways with the General Contractor to avoid areas where raceways may be damaged by subsequent installation of trees, shrubbery or other landscape vegetation.

E. Install underground raceways minimum 3'-0" from parallel runs, and minimum 1'-0" from perpendicular runs, of underground natural gas and propane lines.

F. Do not use torches to heat PVC conduit for field bends. Do not install PVC conduit that has been scorched

by heating for bends.

END OF SECTION 16110

Dead Horse Point State Park
New Restroom Facilities
Division of Facilities Construction Management

SECTION 16120 - CONDUCTORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.02 SCOPE

A. Provide all conductors for power and lighting as shown on drawings and as specified herein.

PART 2 - PRODUCTS

2.01 CONDUCTORS

A. Provide Copper building wire, minimum #12 AWG, with type THHN/THWN or XHHW 600 volt insulation, except as otherwise noted on the drawings or required by NEC.

1. Provide conductors in underground raceways with insulation approved for wet locations such as type THWN or XHHW.

B. Provide stranded conductors for wires #8 AWG and larger and for terminal connections to all motors. Stranded or solid conductors may be used for sizes smaller than #8 AWG at the contractor's option.

C. Provide conductors rated 90^0 C minimum in wiring channels of Fluorescent and High Intensity Discharge lighting fixtures.

D. Provide conductors with surface printed identification showing conductor size and material, insulation type, voltage rating and approvals at regularly spaced intervals of 24".

E. Do not use sizes smaller than #12 AWG in branch circuits carrying load. Circuits requiring larger sizes to meet voltage drop conditions, etc., are indicated on the drawings.

1. Where branch circuit homeruns indicate conductor size, use that size conductor for the entire branch circuit, including switch legs, etc.

F. Do not use aluminum conductors.

2.02 SPLICES

A. Provide Ideal wirenuts or Scotchlock spring connectors for all conductor splices #8 AWG and smaller. Provide split-bolt or compression type connectors for all conductor splices larger than #8 AWG.

B. Provide splices which are UL listed for the type, quantity and size of the conductors to be spliced.

C. Provide all splices with insulation at least equal to that of the conductor.

D. Provide watertight splices in junction or outlet boxes located outside and in wet locations. Provide heat shrink insulating kits or use connectors pre-potted with an approved waterproof compound.

E. Splice conductors only in approved boxes. Do not splice conductors in conduit bodies.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install all conductors in approved raceway systems.

B. Install conductors continuous without splice between outlet boxes, devices and panelboards.

1. Provide suitable junction boxes in readily accessible locations where splices are necessary at intermediate points. Indicate exact location of all boxes on the As-Built Record Drawings.

C. Do not install wiring until work which might cause damage to the wires has been completed.

3.02 COLOR CODING

A. Color code all wiring at each enclosure and box where conductors are accessible and at each splice, tap or termination by means of colored conductor insulation.

1. For conductors #6 AWG and larger, colored self-adhesive tape with the appropriate color designations may be used.

B. Color code each conductor of each circuit as follows.

1. Ground: Green or Bare Copper

2. 120/240 Volt, 1 Phase, 3 Wire System
   a. Phase A - Black
   b. Phase B - Red
   c. Neutral - White

C. Color code switch legs and travelers according to phase with colors other than used for phase conductors, to be consistent throughout the project.

3.03 MULTI-WIRE BRANCH CIRCUITS

A. Where a common neutral is run for multi-wire branch circuits, connect phase conductors to separate phases such that the neutral conductor will carry only the unbalanced current. Use neutral conductors of the same size as the phase conductors unless specifically noted otherwise.

B. Do not install more than two phase conductors in any raceway except where specifically shown on the drawings or approved by the Architect and/or Engineer.

3.04 PHASE ROTATION

A. Phase rotation for Three Phase System will be A leads B from front to back, from left to right or from top to bottom as viewed from the front of the enclosure.

END OF SECTION 16120

SECTION 16130 - ELECTRICAL BOXES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.02 SCOPE

A. Provide junction boxes and outlet boxes at each outlet, fixture and other device location as shown on drawings and as specified herein.

PART 2 - PRODUCTS

2.01 OUTLET AND DEVICE BOXES

A. Provide galvanized or cadmium plated sheet steel electrical boxes in indoor dry locations, of the most suitable size and shape for the conditions encountered and in accordance with NEC requirements for the number of conductors allowed.

B. Provide minimum 4" Square or Octagonal, 1-1/2" Deep Boxes unless specifically indicated otherwise on the drawings.

1. Provide minimum 4" Square or Octagonal, 2-1/8" Deep Boxes where Three (3) conduit connections are required.

2. Provide minimum 4-11/16" Square, 2-1/8" Deep Boxes where Four (4) or more conduit connections are required.

3. Provide gang boxes where more than one device is located at the same point.

4. Boxes smaller than 4" Square or Octagonal, even though of equivalent cubic inch capacity, are not acceptable.

C. Provide Type FD cast metal boxes outside, in wet, humid or corrosive locations and where exposed to damage such as vehicular traffic.

D. Confer with the various equipment suppliers and either use or properly provide for boxes which are furnished with the equipment, such as speakers, horns, bells, etc..

E. Do not use "THRU-THE-WALL" boxes, sectional (gangable) boxes or non-metallic boxes.

2.02 JUNCTION BOXES

A. Provide junction boxes as specified for outlet and device boxes except that boxes 6" square and larger may be painted sheet steel.

2.03 BOX ACCESSORIES

A. Provide fittings, plaster rings, cover plates and other accessories suitable for the purpose and location of

each box.

B. Provide plaster rings which are minimum 1/8" deeper than wall covering for flush mounted boxes (i.e. use 3/4" plaster ring for 5/8" gypsum board wall covering) such that plaster ring will be flush with finished face of wall.

C. Provide industrial raised covers for surface mounted outlet and device boxes.

D. Provide masonry rings for boxes installed in brick walls, concrete block walls and in walls with tile finish.

E. Provide ceiling outlet boxes with standard 3/8" fixture stud where required for fixture to be installed.

PART 3 - EXECUTION

3.01 SUPPORTS

A. Support each box from the building structure independent of the raceway system.

B. Support flush mounted wall boxes with metal bar hangers or metal stud backing behind the box secured to wall studs.

C. Support flush mounted ceiling boxes with metal bar hangers secured to ceiling support system or threaded rod hangers secured to structure.

1. Secure boxes for box supported fixtures to the building structure with suitable anchors capable of supporting not less than 200 lbs or 4 times the fixture weight, whichever is greater.

D. Secure surface mounted boxes to building structure with minimum of 2 screws or bolts as required.

E. Secure boxes in concrete block walls in place prior to pouring grout such that installation of grout will not displace the box and the box will be flush with the finished face of the wall.

F. Do not use side mounted boxes or brackets.

3.02 INSTALLATION

A. Install flush mounted boxes, after being equipped with extensions, accessories, etc., flush with finished face of wall, ceiling or floor.

1. Replace or repair all boxes not installed flush with finished surfaces to the satisfaction of the Architect and/or Owner.

2. In order to meet this requirement, it is recommended that the Electrical Contractor be present during installation of gypsum board, tile or other wall coverings and during installation of outlet boxes in masonry walls.

3. Coordinate depth of wall coverings to be installed on all walls with the General Contractor prior to installing plaster rings.

B. Install boxes in opposite sides of common room walls in adjacent stud spaces where possible and with minimum 6" separation between the boxes. Provide minimum 10" of conduit between boxes which are connected by conduit.

C. Install outlet boxes for light switches on the strike side of door openings. Coordinate door swings with the General Contractor prior to roughing in switch boxes.

D. Install boxes in masonry walls in the cell of the block or behind brick with deep masonry ring to extend flush with the finished wall surface.

E. Seal around the surface of all switch and outlet boxes with plaster or grout to close any opening between the outlet box and the wall finish.

F. Install boxes level and plumb.

3.03 LOCATIONS

A. The wiring system layouts on the drawings are generally diagrammatic and the location of outlets and equipment are approximate.

B. Study all available drawing details, shop drawings, equipment drawings, building conditions and materials surrounding each outlet and device box prior to installing the box to ascertain the exact location required for each box.

C. Rough in the electrical work such that electrical outlets, fixtures and other fittings are properly fitted to the work of other trades.

D. Do not install boxes inside cupboards, behind drawers, or otherwise so located, as to be inaccessible or unsuited for the purpose intended.

E. The right is reserved to make any reasonable change in the location of the outlets before roughing in, without involving additional expense.

3.04 MOUNTING HEIGHT

A. Install outlet and device boxes at the heights shown on the drawings or as directed by the Architect. In general, mount outlets as follows.

1.	Convenience Outlet	18"
2.	Wall Switch	46"

B. All mounting heights, including mounting heights indicated on drawings, are to the center of the outlet box above finished floor or grade unless noted otherwise.

C. Install outlets above counters 4" above the top of the counter backsplash to the center of the outlet. Coordinate mounting heights with the cabinet installer prior to roughing in the outlets.

D. Refer to applicable Specification Sections for mounting heights of devices and equipment not included above or install at heights as directed by the Architect and/or Engineer.

END OF SECTION 16130

SECTION 16140 - OUTLETS AND WIRING DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.02 SCOPE

A. Provide all wiring devices complete with coverplates and necessary accessories as shown on the drawings and as specified herein.

1.03 SUBMITTALS

A. Provide submittals for each type of wiring device to be used on the project in accordance with Division 1 Specifications and Section 16000 - General Provisions, Electrical.

PART 2 - PRODUCTS

2.01 WIRING DEVICES

A. Provide wiring devices rated 20 amps minimum, as specified below, or equivalent of Eagle, General Electric, Hubbell, Leviton or Pass & Seymour.

1.	Switch, Single Pole	Bryant 4901
2.	Receptacle, duplex convenience, 3-wire	Bryant 5352
3.	Receptacle, duplex, GFCI protected	Bryant GFR53FT

B. Color of devices in finished areas will be as selected by the Architect from the manufacturer's standard colors to compliment the color of architectural finishes.

C. Provide Gray devices in unfinished spaces such as mechanical and electrical rooms.

D. Provide convenience outlets with GFCI protection in accordance with NEC requirements, where installed outside or within 6 feet of any sink and as indicated on the drawings.

1. Provide a self-adhesive printed label stating "GFCI PROTECTED" for each outlet protected by feed-through GFCI receptacles or GFCI circuit breakers.

2. Use feed-through GFCI outlets only to protect other outlets within sight of the GFCI protected outlet.

2.02 COVERPLATES

A. Provide a cover plate for each outlet and box suitable for the location and function of the outlet and box.

B. Provide blank cover plates for junction boxes and outlet boxes not used.

C. Provide nylon or impact resistant thermoplastic coverplates for outlets and boxes installed in finished areas, of the same manufacturer and color as the wiring devices.

D. Provide Stainless Steel coverplates for outlets and boxes installed in unfinished areas such as mechanical and electrical rooms.

E. Provide UV Stabilized Polycarbonate, "Raintight While In Use" coverplates with spring return lids and suitable gasket as manufactured by Eagle or Taymac for all devices installed outside or in wet locations.

2.03 MOTION SENSORS

A. Provide passive infrared type motion sensors, as specified below, to control lighting in rooms as indicated on the drawings.

1. Extreme Temperature Ceiling Sensor Novitas 01-340
   a. Nominal 1/2 step walk coverage, open area: 1,500 sq. ft. (25' Dia.')

2. Switchpack Novitas 13-051
   a. 120/277 Volt field selectable circuit voltage rating.
   b. Contact ratings:
      (1) 15 Ampere, 120 VAC, Tungsten
      (2) 20 Ampere, 120/277 VAC, Ballast
   c. NEC Class 2, 15 VDC, control circuit for interface with motion sensors.
   d. Zero crossing circuit to ensure the relay contacts engage at the zero crossing point of the AC Voltage source to minimize contact damage due to high inrush loads such as tungsten lighting and electronic ballasts.

B. Other acceptable manufacturers, subject to compliance with the contract documents are Honeywell, Pass & Seymour, Tork, Uneco and Watt Stopper.

1. Other manufacturer's sensors which require additional sensors for coverage areas shown on the drawings may be used provided additional sensors are furnished and installed by the Contractor without additional cost to the Owner.

2.04 ACCESSORIES

A. Equip each outlet with devices suitable for the purpose of the outlet and with means of properly connecting the equipment served, whether or not such devices are specifically mentioned.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Properly locate each outlet to fulfill its particular purpose. Do not install receptacles or boxes inside cupboards, behind drawers, or otherwise so located, as to be inaccessible or unsuited for the purpose intended.

B. Install all outlets and wiring devices flush with face of coverplate, with the coverplate in contact with the finished face of the wall and with mounting strap of device in contact with the outlet box.

END OF SECTION 16140

SECTION 16190 - SUPPORTING DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.02 SCOPE

A. Provide suitable supporting devices for all electrical equipment, raceways and components as specified herein and as shown on the drawings.

B. Refer to individual specification sections for additional supporting requirements.

PART 2 - PRODUCTS

2.01 SUPPORTING DEVICES

A. Provide support anchors which will support in tension a minimum of 4 times the weight of the equipment to be supported but not less 100 lbs.

B. Provide wood screws in wood; toggle bolts in hollow masonry units; expansion bolts with lead shield or shot anchors in concrete and brick; and machine screws, threaded 'C' clamps or spring-tension clamps on steel work.

C. Do not use tie wire for support unless specifically called for in individual specification sections.

D. Do not use threaded C Clamps on tapered steel sections.

E. Do not weld supports, equipment, boxes, raceways, etc., to steel structures.

F. Do not use wooden plug inserts as a base for supports.

G. Do not use shot anchors or drilled anchors of any kind in prestressed or post-tensioned concrete slabs and beams except as approved in writing by the Architect.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Secure supporting devices to building structure.

B. Do not install supporting devices with sheetrock or plaster as the sole means of support. Provide proper blocking behind the sheetrock or plaster as required to support equipment.

END OF SECTION 16190

SECTION 16195 - ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.02 SCOPE

A. Provide identification of all electrical equipment, devices, enclosures, conductors, cables, etc., as shown on the drawings and as specified herein.

B. Refer to individual specification sections for additional identification requirements.

PART 2 - PRODUCTS

2.01 NAMEPLATES

A. Provide engraved laminated micarta or plastic nameplates to identify each panelboard, cabinet, motor starter, disconnect, etc., with the following minimum lettering heights:

1. Switchboards, panelboards, etc. - 3/8"
2. Disconnects, motor starters, etc. - 1/4"
3. Time switches, lighting contactors, etc. - 3/16"

B. Provide Black Nameplates with White Lettering unless noted otherwise, or required to contrast with equipment enclosures.

C. Do not use Dynamo Labels, printed labels, etc., unless specifically called for in other specification sections or approved by the Architect and/or Engineer.

2.02 EQUIPMENT IDENTIFICATION

A. Provide engraved nameplates on the exterior of each Motor Starter, Safety Switch, etc., to include the Equipment Description, Number or Designation, Voltage, Motor Horsepower and/or Full Load Amps and the Circuit from which the equipment is served.

1. Example: AIR HANDLER AH-2
   10 HP, 480 VOLT, 30
   CIRCUIT MCC1-2B

B. Provide engraved nameplates on the exterior of feeder and other major junction boxes and pull boxes to indicate the function of the wiring within the box such as "PANEL 'A' FEEDER" or "FIRE ALARM PULLBOX".

2.03 PANELBOARD IDENTIFICATION

A. Provide one engraved nameplate on the exterior trim of each Panelboard, visible without opening the door, to include the Panel Designation and the System Voltage.

1. Example: PANEL 'A'
   120/240 V, 1Ø

B. Provide a second engraved nameplate on the interior deadfront cover of each Panelboard to include the Panel Designation, the Distribution Panel serving the panelboard and the location of the Distribution Panel.

1. Example: PANEL 'A'
   MAIN IN 'LDP1'
   MAIN ELECT. ROOM

C. Provide nameplates on each Branch Breaker of Distribution Panelboards to indicate the Panel or Equipment served by the Branch Breaker and the location of the Panel or Equipment.

1. Example: PANEL 'A'
   MAIN FLOOR SOUTH CORRIDOR

2. Install the branch breaker nameplates on the wireway cover trim of panelboards. Do not install the nameplates on interchangeable dead-front trims.

2.04 CONDUCTOR IDENTIFICATION

A. Identify each branch circuit and each feeder conductor at each outlet box, pull box or other accessible location with hand lettering in black India ink in the enclosure to indicate panel and circuit numbers of all conductors in the enclosure.

2.05 PANELBOARD CIRCUIT INDEX

A. Provide a neatly typed index, to include type of load served and the specific location of the load for each branch circuit of each panelboard.

B. Examples
   1. Lighting, Southwest Conference Room
   2. Lighting, 2nd Floor Conf. Rm and Office 208
   3. Outlets, SW Conf. Rm, west and north walls

C. Do not use room numbers shown on plans, use room numbers or nomenclature assigned to rooms by the Owner. Do not use remarks from panel schedules on drawing, the remarks are for the Contractor's reference only.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install nameplates to be visible from normal viewing angles.

B. Attach nameplates to equipment enclosures with stainless steel screws or rivets. Adhesives are not acceptable.

C. Install panel index behind protective plastic covering.

END OF SECTION 16195

SECTION 16400 - SECONDARY SERVICE AND DISTRIBUTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

B. Section 16110 - Raceways

C. Section 16120 - Conductors

1.02 SCOPE

A. Provide complete electrical service as shown on drawings and as specified herein.

1.03 SUBMITTALS

A. Provide shop drawing submittals for Metering Equipment accordance with Division 1 Specifications and Section 16000 - General Provision, Electrical to verify compliance with the Contract Documents.

B. Include Manufacturer's standard published literature for Metering Equipment. Clearly indicate all options, accessories, finishes, etc., to be provided.

C. Include literature to verify compliance with referenced EUSERC, ANSI and UL Standards.

PART 2 - PRODUCTS

2.01 SYSTEM

A. The Secondary Electrical Distribution System will be 120/240 Volt, Single Phase, Three Wire, 60 Cycle for Lighting, Equipment, Appliances and Outlets.

2.02 SERVICE ENTRANCE

? A. Provide underground electrical service conduits as shown on the drawings from the meter base to the main service transformer.

1. Provide Galvanized Rigid Steel (GRC) Conduit elbows with minimum 36" radius for all bends in the underground electrical service conduits.

2. Terminate the service conduits at the main service transformer as directed by the Power Company.

3. Electrical Service Conductors will be provided by the Power Company from the transformer to the line side terminals of the meter base.

4. Include One Hundred Dollar ($100.00) fee for installation of underground electrical service, payable to Utah Power.

2.03 METERING

A. Provide meter sockets to meet the requirements of ANSI C12.7, Requirements for Watthour Meter Sockets and 7UL/ANSI 414 Standard for Safety, Standard for Meter Sockets.

B. Provide a raintight combination meter base to include a manual EUSERC approved manual circuit-closing link bypass with safety socket facilities and sealing provisions as approved by the local power company.

2.04 FEEDERS

A. Sizes and connection of feeders are shown on the Power Riser Diagram. Feeders are sized to handle rated loads and to meet voltage drop conditions.

B. Do not install conductors of different sizes or types in the same conduits.

PART 3 - EXECUTION

3.01 COORDINATION

A. Coordinate electrical service and metering with local power company prior to beginning work.

B. Arrange with serving utility for proper voltage.

3.02 FEEDERS

A. Before or during final job site observation, check each panel feeder and main feeder for balance of load on each phase, and make necessary adjustments to insure acceptable balance.

END OF SECTION 16400

SECTION 16440 - SAFETY SWITCHES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

B. Section 16475 - Fuses

1.02 SCOPE

A. Provide all disconnect switches required by NEC or local regulations as shown on drawings and specified herein.

1.03 SUBMITTALS

A. Provide shop drawing submittals for each Safety Switch type in accordance with Division 1 Specifications and Section 16000 - General Provision, Electrical to verify compliance with the Contract Documents.

B. Include Manufacturer's standard published literature for each switch type. Clearly indicate all options, accessories, finishes, etc., to be provided with each switch type.

PART 2 - PRODUCTS

2.01 SAFETY SWITCHES

A. Provide NEMA KS1, Heavy Duty Type HD, horsepower rated, quick-make, quick-break enclosed load interrupter knife switches, fusible or non-fusible as required, with externally operable handle, lockable in the OFF position and interlocked to prevent opening front cover with switch in ON position.

B. Maximum voltage, current rating and horsepower rating will be clearly indicated on a metal plate riveted or otherwise permanently fastened to the switch enclosure.

C. Provide switches with NEMA 1 enclosures or where indicated as weatherproof, NEMA 3R enclosures.

D. Provide fusible switches rated 600 amps or less with a UL listed rejection feature to reject all fuses except Class R fuses.

2.02 ACCEPTABLE MANUFACTURERS

A. Challenger
B. Cutler Hammer
C. General Electric
D. Siemens
E. Square 'D'

PART 3 - EXECUTION

3.01 SUPPORTS

A. Provide a minimum of four supports, located at each corner of each switch enclosure. Where the enclosure exceeds 36 inches in any dimension, provide additional supports at 24 inches on center maximum.

3.02 MOUNTING HEIGHT

A. In general, mount safety switches 5'-0" above finished floor or grade to center of switch.

B. For exterior disconnects at condensing units, mount top of switch at the same height as the top of the condensing or 3'-0" above grade to top whichever is greater.

3.03 IDENTIFICATION

A. Provide engraved nameplates in accordance with Section 16195 - Identification.

B. Provide adhesive tag on inside door of each fused switch indicating NEMA fuse class and rating installed.

END OF SECTION 16440

SECTION 16450 - SECONDARY GROUNDING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.02 SCOPE

A. Ground all non-current carrying metallic parts of electrical equipment, raceway systems and the neutral conductor of the wiring system as shown on the drawings and specified herein.

PART 2 - PRODUCTS

2.01 GROUND CONDUCTORS

A. Provide copper ground conductors, minimum No. 8 AWG solid. Stranded conductors may be used for sizes No. 2 AWG and larger.

2.02 GROUND CONNECTIONS

A. Make the electrical service ground connection at the main service equipment and connect to metallic water service, concrete encased electrode and ground rods as shown on the drawings and in accordance with NEC Article 250 Part III.

B. Bond the neutral conductor to electrical service ground system at the main transformer and the main service equipment only.

C. Bond all interior metallic piping systems to the electrical service ground system.

D. Make above ground connections by means of pressure connectors, compression connectors, clamps or other means which are UL Listed and classified as suitable for purpose.

E. Make all underground connections by means of an exothermic welding process equal to Cadweld or Thermoweld, in strict accordance with manufacturer's written instructions and recommendations.

2.03 GROUND RODS

A. Provide copper ground rods, minimum 3/4" diameter and 10'-0" long, which conform to UL 467, Grounding and Bonding Equipment where indicated on the drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Leave ground connections accessible for inspection.

B. Install ground rods minimum 8 feet into earth. Space adjacent ground rods minimum 6 feet apart.

C. Connect grounding conductors for grounding receptacles, etc., to a ground terminal in the panelboard.

Provide a separate ground terminal for each grounding conductor as it is brought into the panelboard.

D. Install all grounding in accordance with the latest edition of the National Electrical Code.

3.02 GROUND RESISTANCE MEASUREMENTS

A. Measure the resistance to ground using the fall-of-potential method described in IEEE No. 81. The resistance values, soil conditions at the time of measurement and the location of each ground rod shall be recorded and forwarded to the Owner and Engineer.

B. If a ground resistance of 25 Ohms or less cannot be obtained with the indicated ground electrodes, provide a supplementary ground electrode consisting of 3/4" x 10'-0" copper ground rods or deep driven sectional ground rods until a resistance of 25 Ohms or less is obtained. Total length of additional ground rods will not be required to exceed 30 feet. Space additional ground rods as evenly as possible and at least 6 feet from any other ground rods.

END OF SECTION 16450

SECTION 16470 - PANELBOARDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.02 SCOPE

A. Provide new panelboards complete with all necessary accessories as shown on drawings and as specified herein.

1.03 SUBMITTALS

A. Provide shop drawing submittals for each Panelboard in accordance with Division 1 Specifications and Section 16000 - General Provision, Electrical to verify compliance with the Contract Documents.

B. Include dimensioned construction drawings for each Panelboard. Clearly indicate voltage, ampacities, breaker types, conduit entrance areas, materials, options, accessories, finishes, etc., to be provided with each Panelboard. Include Series-Rated verification where required.

PART 2 - PRODUCTS

2.01 PANELBOARDS

A. Provide dead front safety type panelboards, constructed in accordance with NEMA and UL standards, with plated aluminum or copper bus bars.

B. Provide each panelboard with main circuit breaker, single lugs or double lugs for attaching feeder conductors and/or sub-feeder conductors as shown on the drawings.

C. All panelboards to be 20" wide minimum.

D. Provide panelboards with NEMA 1 enclosures unless indicated otherwise on the drawings.

E. Arrange circuit breakers in double vertical row configuration with bolted bus connections.

F. Provide panelboard fronts with concealed indicating trim clamps, concealed steel door hinges and a flush mounted combination latch and lock. Key all locks alike for all panelboards furnished for the project.

G. Provide each panelboard with an approved circuit index holder with transparent protective cover on the inside of panelboard door.

H. Provide a ground bus in each panelboard with a separate terminal for connection of each feeder and each branch circuit ground conductor.

I. Panelboard schedules as shown on drawings.

2.02 CIRCUIT BREAKERS

A. Provide thermal-magnetic type circuit breakers unless noted otherwise.

B. Provide multi-pole breakers with trip elements in each pole and common trip handle.

C. Provide "HACR" rated circuit breakers to serve heating, ventilating and air conditioning equipment branch circuits.

D. Provide "SWD" rated circuit breakers to serve all lighting and outlet branch circuits.

E. Plug-in breakers are not acceptable.

2.03 INTERRUPTING RATING

A. Provide panelboards with minimum short circuit current interrupting ratings as shown on the drawings.

B. The interrupting rating of circuit breakers shall be at least equal to the available short circuit current at the line terminals of the circuit breaker and correspond to the UL listed integrated short circuit current rating specified for the panelboards.

C. The minimum interrupting ratings of circuit breakers used as feeders and branches may be in accordance with UL 489 tested and certified series-connected circuit breaker combinations. All electrical equipment using the Series Rated circuit breaker combinations shall be clearly marked on the panel nameplate and feeder breaker indicating the same.

2.04 ACCEPTABLE MANUFACTURERS

A. Challenger
B. Cutler Hammer
C. General Electric
D. Siemens
E. Square 'D'

PART 3 - EXECUTION

3.01 SUPPORTS

A. Provide a minimum of four supports, located at each corner of each panelboard. Where the enclosure exceeds 36 inches in any dimension, provide additional supports at 24 inches on center maximum.

3.02 MOUNTING HEIGHT

A. In general, mount panelboards 6 feet above finished floor or grade to top of panel.

3.03 IDENTIFICATION

A. Provide nameplates and neatly typed circuit index for each panelboard in accordance with Section 16195 - Electrical Identification.

END OF SECTION 16470

SECTION 16475 - FUSES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.02 SCOPE

A. Provide fuses of the proper sizes and rating for each fusible switch as shown on the drawings and as specified herein.

PART 2 - PRODUCTS

2.01 FUSES

A. Provide UL Class L or UL Class R, current limiting fuses, rated for up to 200,000 amperes interrupting capacity.

1. For main service and all feeder circuits, furnish UL Class RK1 fuses up to 600 Amperes and UL Class L fuses over 600 Amperes. Furnish UL Class RK1, Time-Delay fuses for feeders to motors or transformers.

2. For branch circuits feeding motors, furnish UL Class RK5, Time-Delay fuses and for branch circuits other than motors, furnish UL Class RK5 non time delay fuses.

B. Provide fuses which are a standard product of Bussman, Cefco, Gould/Shawmut, or Reliance.

2.02 SPARE FUSES

A. Provide a 20 percent complement, but not less than three, of each rating of each type of fuse used on the project. Install the spare fuse cabinet in the main electrical room or as shown on the plans. Turn over spare fuses to the Owner during or prior to Final Inspection.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install only fuses of the same type and rating in each fusible switch.

3.02 COORDINATION

A. Coordinate fuse sizes for packaged mechanical equipment with mechanical contractor. Provide fuse sizes as indicated on the equipment nameplate.

END OF SECTION 16475

SECTION 16480 - MOTOR STARTERS AND CONTROLS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.02 SCOPE

A. Provide motor starters, pushbutton stations, and other necessary operating devices for all Motors and Equipment as shown on the drawings and as specified herein.

B. Thermostats and similar control devices and control wiring for control of heating, ventilating and air conditioning equipment will be furnished and installed by the Controls Contractor under the provisions of Division 15 Specifications.

1.03 SUBMITTALS

A. Provide shop drawing submittals for each Motor Starter in accordance with Division 1 Specifications and Section 16000 - General Provision, Electrical to verify compliance with the Contract Documents.

B. Include Manufacturer's standard published literature for each starter type. Clearly indicate all sizes, ratings, control devices, options, accessories, finishes, etc., to be provided with each starter.

C. Include typical control wiring diagram for starters provided with accessories such as start-stop pushbuttons, control transformers, pilot lights, etc.. Number terminals and wiring on submittal drawings to match numbering on actual devices.

PART 2 - PRODUCTS

2.01 MOTORS

A. Unless otherwise noted herein or on the drawings, Motors 1/2 HP and smaller will be Single-Phase rated at 115 or 120 volt. Motors larger than 1/2 HP will be Single-Phase with nameplate rating of 230 volt when used on a 120/240 volt system.

2.02 MANUAL MOTOR STARTERS

A. Provide Allen Bradley Bulletin 600 single phase manual thermal overload switches with overload heaters for each single phase motor where indicated on drawings.

B. Provide Allen Bradley Bulletin 609 three phase manual thermal overload switches with overload heaters for each three phase motor where indicated on drawings.

C. Provide manual thermal overload switches with pilot light where indicated on drawings.

2.03 ENCLOSURES

A. Provide starters with NEMA 1 Enclosures where located in indoor normally dry locations.

B. Provide starters with NEMA 12 Enclosures where located in humid, corrosive and oily locations such as Boiler Rooms, etc..

C. Provide starters with NEMA 4X enclosures where located in outside or in wet locations. Provide suitable drain for starters located outside in accordance with the manufacturers written instructions.

2.04 HEATER CHARTS

A. Provide manufacturer's standard chart inside the door of each starter indicating overload heater types, sizes and ratings for the starter.

B. Provide manufacturer's standard chart inside the door of each starter indicating solid state overload relay trip ratings and settings for the starter.

2.05 ACCEPTABLE MANUFACTURERS

A. Allen Bradley
B. Challenger
C. Cutler Hammer
D. Furnas
E. General Electric
F. Siemens
G. Square 'D'

PART 3 - EXECUTION

3.01 SUPPORTS

A. Provide a minimum of four supports, located at each corner of each enclosure. Where enclosure exceeds 36 inches in any dimension, provide additional supports at 24 inches on center maximum.

3.02 MOUNTING HEIGHT

A. In general, mount individual motor starters 4'-0" above finished floor or grade to center of starter.

3.03 COORDINATION

A. Give special attention to wiring and controls for two-speed motors or motors with special controls at no additional cost to the Owner.

B. Determine exact location of all electrical devices controlling mechanical equipment in cooperation with the Mechanical Contractor in the field before roughing-in.

END OF SECTION 16480

SECTION 16500 - LIGHTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.02 SCOPE

A. Provide all lighting fixtures, as shown on drawings and as described herein, complete with all necessary wiring, sockets, lamps, auxiliaries, supports, etc..

1.03 SUBMITTALS

A. Provide shop drawing submittals for each Fixture and Ballast type in accordance with Division 1 Specifications and Section 16000 - General Provision, Electrical to verify compliance with the Contract Documents.

B. Include Manufacturer's standard published literature for each fixture type. Clearly indicate all options, accessories, finishes, etc., to be provided with each fixture type.

C. Provide construction drawings for custom fixtures and/or accessories to include mounting details, manufacturing methods, wiring methods, finishes, materials, etc., as required.

D. Include Manufacturer's standard published literature for each ballast type to be used on the project. Provide literature for each ballast manufacturer which the fixture manufacturer may use depending upon availability at the time the fixtures are manufactured.

PART 2 - PRODUCTS

2.01 FIXTURES

A. Provide fixtures which comply with the appropriate Underwriters Laboratories (UL) Standards for the fixture type and which are UL Listed and UL Labeled.

B. Acceptable fixture manufacturers and types are indicated on the Fixture Schedule included with the Drawings.

1. Listing of the manufacturer's catalog numbers on the Fixture Schedule is intended to establish the general fixture type required and does not relieve the contractor and/or supplier from the responsibility to provide all accessories and options included in the fixture description nor from meeting the requirements of this specification.

C. Provide all recessed light fixtures with thermal protection in compliance with NEC Article 410-65 (c) and UL Test Standard 1571.

D. Provide individual fixtures with multiple ballasts as required to meet lamp switching requirements shown on the drawings.

2.02 FLUORESCENT BALLASTS

A. Provide UL Listed, CBM-Certified by ETL fluorescent ballasts with Class 'A' sound rating which meet the energy efficient requirements of Public Law 100-357 (National Appliance Energy Conservation Amendment of 1988 to the Energy Policy and Conservation Act of 1987) for the lamp types to be served by the ballast.

B. Provide fluorescent ballasts with the proper lamp circuit voltage and rating for the lamp types to be served by the ballast.

C. Ballasts shall be potted, in a steel case and contain no PCBs.

D. Ballasts shall be marked with manufacturer's name, part number, supply voltage, power factor, open circuit voltage, current draw for each lamp type, UL listing, CBM Certification and Date of Manufacture Code.

E. Fluorescent Ballasts shall be of U.S. Manufacture. Acceptable Manufacturers, subject to compliance with Contract Documents, are Advance, Magnetek and Motorola.

F. Provide Solid State Electronic Ballasts for Fixture Types as specified in the Fixture Schedule on the drawings.

1. Provide Premium Class 'P' Electronic Ballasts. Operating temperature of the ballasts shall not exceed 60^0 C at any point on the case during normal operation.

2. Electronic Ballasts shall operate lamps at a frequency of 20 to 35 KHz with no detectable lamp flicker.

3. Electronic Ballasts shall comply with FCC and NEMA limits governing EMI and RFI and shall not interfere with the operation of other normal electric and electronic equipment.

4. Provide Electronic Ballasts with the following characteristics:

a. Minimum Ballast Factor	0.88
b. Minimum Power Factor	95%
c. Maximum Total Harmonic Distortion (THD)	10%

5. Electronic Ballast Warranty shall be 5 Years from the "Date of Manufacture" Code on the ballast.

2.03 LAMPS

A. Provide lamps of the Wattages, Types, and with color characteristics as indicated on the Fixture Schedule included with the Drawings.

B. Provide fluorescent lamps which conform to the Energy Policy Act of 1992 and the applicable ANSI Designations for the lamp wattage and type.

1. Fluorescent Lamps shall be compatible with supplied ballasts to meet the energy conservation requirements of Public Law 100-357.

C. Provide new fluorescent lamps with reduced mercury content, such as Phillips "Alto" Series Fluorescent Lamps, to meet the requirements of the EPA Resource Conservation Recovery Act for Toxic Characteristic Leaching Procedure.

D. Acceptable Lamp Manufacturers, subject to compliance with the Contract Documents are General Electric, Phillips, Sylvania and Venture.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Properly center fixtures in each room. Where multiple fixtures occur, space them uniformly and in straight lines with each other.

B. Locate recessed ceiling light fixtures to center on a single tile or at the intersection of four tiles.

C. Carefully lay out all openings required for recessed lighting units. Cooperate with other contractors and make provisions for openings of exact dimensions required and provide all required plaster rings and ground frames to be inserted in openings.

D. Where lighting fixtures are shown to conflict with locations of structural members and mechanical or other equipment, provide adequate supports and wiring to clear same.

3.02 SUPPORTS

A. Provide all necessary connectors, straps, etc., for secure mounting of all fixtures.

B. Support fixtures installed in suspended grid type ceilings from building structure independent of the ceiling support system with a 12 gauge galvanized steel tie wire or #10 jack chain located at each corner of the fixture.

C. Support recessed fixtures installed in gypsum board ceilings to the ceiling support system with metal bar hangers or suitable brackets.

D. Support surface mounted fluorescent fixtures installed on gypsum board or concrete ceilings from the ceiling with proper anchors at each corner of the fixture.

E. Fixtures designed to be supported from the outlet box will not require any additional support. Provide proper outlet box with fixture stud or plaster ring suitable to support the fixture. Secure the outlet box to the building structure with suitable anchors capable of supporting not less than 200 lbs or 4 times the fixture weight, whichever is greater.

F. Provide suspended fixtures with swivel hangers to insure plumb installation. Secure hangers to the building structure with suitable anchors capable of supporting not less than 200 lbs or 4 times the fixture weight, whichever is greater. Install hangers such that the motion of swivels or hinged joints will not cause sharp bends in conductors or damage to insulation.

3.03 LAMP BURN-IN

A. Burn-in all fluorescent lamps for a minimum of 100 hours prior to completion of the project and replace all defective lamps.

3.04 COORDINATION

A. Coordinate ceiling types with General Contractor and verify compatibility with fixture mounting provisions prior to ordering fixtures. Immediately notify the Architect in writing of any discrepancies between ceiling types and specified fixture types.

B. Verify available voltages and coordinate fixture voltage with the fixture supplier prior to ordering fixtures.

Immediately notify the Architect in writing of any discrepancies between available voltages and the specified fixture voltages.

C. Coordinate fixture locations with other contractors to provide adequate clearance between fixtures and ductwork, piping, structural members, etc., for proper installation of fixtures and provide access for maintenance or replacement of the fixtures.

END OF SECTION 16500