STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

Division of Facilities Construction and Management

DFCM

STANDARD LOW BID PROJECT
Project Budgets Over $100,000

July 23, 2008

Facilities Management Building

Southern Utah University

Cedar City, Utah

DFCM Project Number 08115730

Sargent Design Group
36 North 300 West
Cedar City, Utah 84720

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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 Supplemental General Conditions dated July 15, 2008
DFCM General Conditions dated May 25, 2005.
DFCM Application and Certification for Payment dated May 25, 2005.

Technical Specifications : Attached and dated 5-30-08
Drawings: Attached and dated 5-30-08

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:

SOUTHERN UTAH UNIVERSITY
FACILITIES MANAGEMENT BUILDING
DFCM PROJECT NO:08115730

Bids will be in accordance with the Contract Documents that will be available on **Wednesday, July 23, 2008**, 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 Jeff Reddoor, DFCM, at 801-971-9830. No others are to be contacted regarding this bidding process. The construction estimate for this project is $439,611.00.

A **mandatory** pre-bid meeting will be held at **2:00 PM** on **Wednesday, July 30, 2008** at SUU Campus, Physical Plant Building, 351 West Center Street, Cedar City, Utah. All bidders wishing to bid on this project are required to attend this meeting.

Bids will be received until the hour of **2:00 PM** on **Monday**, **August 11, 2008** 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
Joanna Reese, Contract Coordinator
4110 State Office Building, Salt Lake City, Utah 84114

PROJECT DESCRIPTION

Project will consist of: One 4150 SF Masonry constructed building. Wood trusses, slab on grade, Asphalt shingle roofing, concrete walks and paved asphalt parking lot.

Gas, water, sewer and power already provide to site.

PROJECT SCHEDULE

PROJECT NAME: FACILITIES MANAGEMENT BUILDING
SOUTHERN UTAH UNIVERSITY – CEDAR CITY, UTAH
DFCM PROJECT NO. 08115730

Event	Day	Date	Time	Place
Bidding Documents Available	Wednesday	July 23, 2008	1:00 PM	DFCM 4110 State Office Bldg SLC, UT and the DFCM web site *
Mandatory Pre-bid Site Meeting	Wednesday	July30, 2008	2:00 PM	SUU Campus-Physical Plant Building 351 W. Center, Cedar UT
Last Day to Submit Questions	Tuesday	August 5, 2008	3:00 PM	Jeff Reddoor – DFCM E-mail jreddoor@utah.gov Fax 801-538-3267
Addendum Deadline (exception for bid delays)	Thursday	August 7, 2008	3:00 PM	DFCM web site *
Prime Contractors Turn In Bid and Bid Bond	Monday	August 11, 2008	2:00 PM	DFCM 4110 State Office Bldg SLC, UT
Sub-contractor List Due	Tuesday	August 12, 2008	2:00 PM	DFCM 4110 State Office Bldg SLC, UT Fax 801-538-3677
Substantial Completion Date	Friday	December 19, 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 **Facility Management Building – Southern Utah University – Cedar City, Utah – DFCM Project No. 08115730** 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 December 19, 2008, should I/we be the successful bidder, and agree to pay liquidated damages in the amount of **$ 1,500.00** 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:

_____

_____

STATE OF _____)
) ss.
COUNTY OF _____)

By: _____
Attorney-in-Fact (Affix Corporate Seal)

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 and Supplemental General Conditions dated July 15, 2008 ("also referred to as General Conditions") 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

_____
Lynn A. Hinrichs Date
Assistant Director Construction Management

APPROVED AS TO FORM:
ATTORNEY GENERAL
July 15, 2008
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: _____ (Seal)

Attorney-in-Fact

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

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:

TABLE of CONTENTS

BIDDING REQUIREMENTS

CONDITIONS

SPECIFICATIONS

DIVISI0N 01 - GENERAL REQUIREMENTS

DIVISION 02 - SITE WORK

DIVISION 04 - MASONRY

DIVISION 05 - METALS

NOT USED

DIVISION 06 - WOOD & PLASTICS

DIVISION 07 - THERMAL & MOISTURE PROTECTION

DIVISION 11 - EQUIPMENT

NOT USED

DIVISION 12 - FURNISHINGS

NOT USED

DIVISION 13 - SPECIAL CONSTRUCTION

DIVISION 14 CONVEYING SYSTEMS

NOT USED

DIVISION 15 - MECHANICAL

SEE SHEET INDEX AT DIVISION 15

DIVISION 16 - ELECTRICAL

SEE SHEET INDEX AT ELECTRICAL SECTION

SECTION 01100

SUMMARY

PART 1 GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

A. Conditions
   1. Conditions of the Contract apply to each Division of the Specifications.
   2. Provisions contained in this Division apply to Divisions 02 through 16 of the Specifications.

1.2 SCOPE OF WORK

A. Work will include the following: concrete masonry unit exterior walls with furred interior; asphalt shingles over roof decking over pre-engineered trusses; all exterior and interior doors and windows; all interior finish materials; casework as identified on the drawings; all hvac, plumbing and electrical systems as identified on the drawings; site work as indicated on the drawings; and all other work identified on the drawings. Any questions concerning items included in the contract should be address to the architect.

B. Work not part of this contract: all furniture will be under separate contract.

1.3 WORK RESTRICTIONS

A. During construction period, Contractor shall have full use of premises for construction operations, including use of site. Contractor's use of premises is limited by Owner's right to perform construction operations with its own forces or to employ separate contractors on portions of Project and to items listed below.
   1. Confine operations to areas within Contract limits shown on Drawings. Do not disturb portions of site beyond Contract limits.
   2. Do not allow alcoholic beverages, illegal drugs, nor those under their influence on Project site.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01200

PRICE & PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Administrative and procedural requirements governing Contractor's Applications for Payment.

B. Related Sections
   1. Section 01300, Administrative Requirements - Requirements for Contractor's Construction Schedule & Submittal Schedule.
   2. Section 01600, Product Requirements - Administrative procedures for handling requests for substitutions.

1.2 PAYMENT PROCEDURES

A. Payment Requests
   1. Each Payment Request shall be consistent with previous requests and payments certified by Architect and paid for by Owner. Initial Payment Request, Payment Request at time of Substantial Completion, and final Payment Request involve additional requirements specified below.
   2. Payment Request Forms - Use standard AIA Payment Request forms.
   3. Request Preparation
      a. Complete every entry on Payment Request form. Incomplete applications will be returned without action.
      b. Entries shall match data on Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.
      c. Include amounts for Modifications issued before last day of construction period covered by request.
   4. Transmittal - Submit a single executed original Payment Request form to Architect. Include waivers of lien and similar attachments when required. Transmit each Payment Request form with transmittal form listing attachments and recording appropriate information related to request as directed by Architect.
   5. Initial Payment Request - Administrative actions and submittals that shall precede or coincide with submittal of first Payment Request include
      a. List of Subcontractors.
      b. Copies of building permits.
      c. Copies of authorizations and licenses from governing authorities for performance of the Work.
      d. Initial progress report.
      e. Minutes of preconstruction meeting.
      f. Schedule of Values.
      g. Contractor's Construction Schedule, preliminary if not final.
      h. Submittal Schedule, preliminary if not final.
   6. Payment Request At Substantial Completion - Following issuance of Certificate of Substantial Completion, submit Payment Request. Administrative actions and submittals that shall precede or coincide with this request include
      a. Operations & Maintenance Manuals
      b. Change-over information related to Owner's occupancy, use, operation and maintenance.
      c. Final cleaning.
      d. Application for reduction of retainage, and consent of surety.
      e. Occupancy permits and similar approvals.
      f. Meter readings.
   7. Final Payment Request - Administrative actions and submittals that shall precede or

coincide with submittal of this request include

a. Completion of Project closeout requirements.
b. Completion of items specified for completion after Substantial Completion.
c. Assurance that unsettled claims will be settled.
d. Assurance that work not completed and accepted will be completed without undue delay.
e. Transmittal of required Project construction records to Owner.
f. Proof that taxes, fees and similar obligations have been paid.
g. Removal of temporary facilities and services.
h. Removal of surplus materials, rubbish, and similar elements.
I. Change of door locks to allow Owner's access.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01300

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Administrative and supervisory requirements necessary for Project coordination.
   2. Administrative and procedural requirements for Project meetings.
   3. Administrative and procedural requirements for submittals required for performance of the Work.

B. Related Sections
   1. Refer to other Division 01 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to -
      a. Permits.
      b. Applications for payment.
      c. Performance and payment bonds.
      d. Insurance certificates.
      e. List of Subcontractors.

1.2 PROJECT MANAGEMENT & COORDINATION

A. General
   1. This Project designation shall be included on documents generated for Project by Contractor and Subcontractors, or be present on a cover letter accompanying such documents. This designation is required to facilitate tracking of materials, equipment, systems, and products used on Church's Projects by Church and by manufacturers specified in Contract Documents.

B. Project Coordination
   1. Coordinate construction activities included in Contract Documents to assure efficient and orderly installation of each part of the Work. Coordinate construction operations that are dependent upon each other for proper installation, connection, and operation.
      a. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in sequence required to obtain best results.
      b. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service, and repair.
      c. Make adequate provisions to accommodate items scheduled for later installation.
   2. Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings. Prepare similar memoranda for Owner and separate Contractors where coordination of their Work is required.
   3. Administrative Procedures - Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to -
      a. Preparing of schedules.
      b. Installing and removing temporary facilities.
      c. Delivering and processing submittals.
      d. Progress meetings.
      e. Project Close-out activities.
   4. Conservation - Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

C. Project Meetings

1. Preconstruction Conference -
   a. Architect will schedule preconstruction conference and organizational meeting at Project site or other convenient location by 15 days after issuance of Notice To Proceed and before commencement of construction activities. Architect will conduct meeting to review responsibilities and personnel assignments.
   b. Attenders - Owner, Architect, and their consultants, Contractor and his superintendent, major Subcontractors and other concerned parties shall each be represented at conference by persons familiar with and authorized to conclude matters relating to the Work.
   c. Agenda - Discuss items of significance that could affect progress including such topics as
      1) Tentative construction schedule.
      2) Critical Work sequencing.
      3) Designation of responsible personnel.
      4) Procedures for processing interpretations and Modifications.
      5) Procedures for processing Payment Requests.
      6) Distribution of Contract Documents.
      7) Submittal of Product Data, Shop Drawings, Samples, Quality Assurance/Control submittals.
      8) Preparation of record documents and O & M manual.
      9) Use of the premises.
      10) Office, work, and storage areas.
      11) Equipment deliveries and priorities.
      12) Safety procedures.
      13) First aid.
      14) Security.
      15) Housekeeping.
      16) Working hours.
      17) Resolving current problems.
      18) Further orientation as to requirements of Contract Documents.
      19) Architect's responsibility to Owner for inspection.
      20) Working out general schedule of Architect's inspection.
   d. Architect will record significant discussions and agreements and disagreements of each meeting and distribute minutes of meeting to everyone concerned, including Owner, within three working days.
2. Progress Meetings -
   a. Architect will conduct progress meetings at Project site at regularly scheduled intervals, at least once a month.
   b. Owner, Architect, Contractor, and each Subcontractor concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings by persons familiar with Project and authorized to conclude matters relating to progress.
   c. Agenda -
      1) Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
      2) Progress since last meeting will be reviewed. Where each activity is in relation to Contractor's Construction Schedule, whether on time or ahead or behind schedule, will be determined. How construction behind schedule is to be expedited will be decided and commitments secured from parties involved to do so. Schedule revisions required to ensure that current and subsequent activities will be completed within Contract Time will be discussed.
      3) Present and future needs of each entity present will be discussed, including such items as -
         a) Interface requirements.
         b) Time.
         c) Sequences.
         d) Deliveries.
         e) Off-site fabrication problems.

f) Access.
g) Site use.
h) Temporary facilities and services.
i) Hours of work.
j) Hazards and risks.
k) Housekeeping.
l) Quality and Work standards.
m) Modifications.
n) Documentation of information for Payment Requests.

d. Architect will include brief summary, in narrative form, of progress since previous meeting. By three days after each progress meeting date, Architect will distribute copies of minutes of meeting to each party present and to parties who should have been present, including Owner.

c. Revise Contractor's Construction Schedule after each progress meeting where revisions to schedule have been made or recognized. Issue revised schedule by three days after each progress meeting date, to each party present and to parties who should have been present, including Owner.

3. Pre-installation Meetings -a. Architect will develop a schedule for pre-installation meetings based on Contractor's Construction Schedule. Architect will schedule these meetings at same time Architect's regularly scheduled inspection visits, if possible. Pre-installation meetings will be held at site before commencement of work specified in trade Sections requiring such a meeting.

b. Attenders - Architect, Contractor, applicable Subcontractors, item or system suppliers/installers, Manufacturer's representatives, and others as specified or invited. Architect will conduct meeting.

1) Review progress of other construction activities and preparations for particular activity under consideration at each pre-installation meeting, including requirements for -
a) Reviewing and confirming requirements of Contract Documents including related Modifications.
b) Verifying that completed work is ready for installation of items or systems.
c) Resolving conditions not in compliance with installation requirements.
d) Establishing installation and inspection schedule.
e) Coordination between trades.
f) Other trades which affect work of trade Section.
g) Other items specified in individual Sections.
h) Deliveries.
i) Shop Drawings, Product Data, Samples, and Quality Assurance/Control submittals.
j) Possible conflicts.
k) Compatibility problems.
l) Weather limitations.
m) Manufacturer's recommendations.
n) Compatibility of materials.
o) Temporary facilities.
p) Space and access limitations.
q) Governing regulations.
r) Safety.
s) Testing requirements.
t) Required performance results.
u) Recording requirements.
u) Protection.

2) Architect will record significant discussions and agreements and disagreements of each meeting, and distribute minutes of meeting within three working days to everyone concerned, including Owner.

3) Make adjustments to work schedule necessitated by decisions of meeting. Do not proceed with work of Section involved if conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene conference within

one week.

1.3 CONSTRUCTION PROGRESS DOCUMENTATION

A. Contractor's Construction Schedule

1. Prepare fully developed, horizontal bar chart type Contractor's Construction Schedule. Submit within 30 days of date established for 'Commencement of the Work.'
   a. Provide separate time bar for each significant construction activity. Provide continuous vertical line to identify first working day of each week. Use same breakdown of units of the Work as shown in Schedule of Values.
   b. Within each time bar show estimated completion percentage in 10 percent increments. As Work progresses, place contrasting mark in each bar to indicate actual completion.
   c. Prepare schedule on sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data for entire construction period.
   d. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on schedule with other construction activities, including minor elements involved in sequence of the Work. Show each activity in proper sequence. Show graphically sequences necessary for completion of related portions of the Work.
   e. Coordinate Contractor's Construction Schedule with Schedule of Values, list of subcontracts, submittal schedule, progress reports, payment requests, and other schedules.
   f. Show completion before date established for Substantial Completion. Show Substantial Completion on schedule to allow time for Architect's procedures necessary for certification of Substantial Completion.
2. Show important stages of construction for each major portion of the Work, including testing and installation.
3. Provide separate time bar to identify each major construction area for each major portion of the Work. Show where each element in an area must be sequenced or integrated with other activities.
4. At head of schedule, provide two item cost correlation lines, indicating 'precalculated' and 'actual' costs. On line, show dollar-volume of work completed as of dates used for preparation of payment requests. Refer to Section 01200 for cost reporting and payment procedures.
5. Following response to initial submittal, print and distribute copies to Architect, Owner, Subcontractors, and other parties required to comply with scheduled dates. Post copies in Project meeting room and temporary field office. When revisions are made, distribute to same parties and post in same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
6. Revise schedule after each meeting or activity where revisions have been recognized or made. Issue updated schedule concurrently with report of each meeting.
7. Acceleration Of The Work -
   a. If circumstances require that the Work or portion thereof be completed at date earlier than Contract completion date as adjusted by Modifications and if directed by Architect or Owner, increase forces, equipment, hours of work, and/or number of shifts and speed up delivery of materials to meet altered completion date or dates ordered or directed. Any increase in cost to Contractor in compliance with such orders or directives will be reflected in an adjustment in Contract Sum in accordance with additional work performed.
   b. If in judgment of Architect or Owner the Work is behind schedule and rate of placement of work is inadequate to regain scheduled progress and if so informed by Architect or Owner, immediately take action to increase rate of work placement.
      1) This shall be accomplished by any one or a combination of the following or other suitable measures -
         a) An increase in working forces,
         b) An increase in equipment or tools,
         c) An increase in hours of work or number of shifts,
         d) Speeding up delivery of materials.
      2) Within 10 days after being so informed, notify Architect of specific

measures taken and/or planned to increase rate of progress with an estimate of when scheduled progress will be regained. If plan of action is deemed inadequate by Architect or Owner, take additional steps or make adjustments to plan of action until it meets with Architect's or Owner's approval.

3) Acceleration of work will continue until scheduled progress is regained. Establish scheduled progress from latest revised approved progress schedule for Project. Timely completion is understood to be contract completion date as revised by time extensions granted at time acceleration is undertaken.

4) No additional compensation for additional effort applied to the Work under terms of this subparagraph will be granted.

c. Any directive or order to accelerate the Work will be in writing. Any directive or order terminating accelerated work will be in writing.

B. Daily Construction Reports

1. Prepare daily reports of operations at Project containing at least following information -
   a. List of Subcontractors at site.
   b. Approximate count of personnel at site by trade.
   c. High and low temperatures, general weather conditions.
   d. Major items of equipment on site.
   e. Materials, equipment, or Owner-furnished items arriving or leaving site.
   f. Accidents and unusual events.
   g. Site or structure damage by water, frost, wind, or other causes.
   h. Meetings and significant decisions.
   i. Visitors to the job including meeting attenders.
   j. Stoppages, delays, shortages, losses.
   k. Any tests made and their result if known.
   l. Meter readings and similar recordings.
   m. Emergency procedures.
   n. Orders and requests of governing authorities.
   o. Modifications received, carried out.
   p. Services connected, disconnected.
   q. Equipment or system tests and start-ups.
   r. Brief summary of work accomplished that day.
2. Forward daily reports to Architect on at least a weekly basis. Preface each packet of daily reports with a Project Status Report summarizing the attached daily reports.
3. Maintain file of copies of daily reports on site and make available to Architect and Owner upon request.

1.4 SUBMITTAL PROCEDURES

A. General

1. Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently before performance of related construction activities to avoid delay.
   a. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   b. Coordinate transmittal of different types of submittals required for related elements of the Work so processing will not be delayed by need to review submittals concurrently for coordination. Architect reserves right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
   c. Allow sufficient review time so installation will not be delayed by time required to process submittals, including time for resubmittals.
      1) Allow 21 days for initial review. Allow additional time if processing must be delayed to allow coordination with subsequent submittals. Architect will promptly advise Contractor when submittal being processed must be delayed for coordination.
      2) If an intermediate submittal is necessary, process same as initial submittal.
      3) Allow 10 days for reprocessing each submittal.

4) No extension of Contract Time will be authorized because of failure to transmit submittals to Architect sufficiently before work is to be performed to allow processing.

2. Place a permanent label or title block on each submittal for identification. Include name of entity that prepared each submittal on label or title block.
   a. Provide space approximately 4 by 5 inches on label or beside title block on Shop Drawings to record Contractor's review and approval markings and action taken.
   b. Include following information on label for processing and recording action taken.
      1) Project name.
      2) Date.
      3) Name and address of Architect.
      4) Name and address of Contractor.
      5) Name and address of Subcontractor.
      6) Name and address of supplier.
      7) Name of manufacturer.
      8) Number and title of appropriate Specification Section.
      9) Drawing number and detail references, as appropriate.
3. Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Architect using transmittal letter. On transmittal, record relevant information and requests for data. Include Contractor's certification that information complies with Contract Document requirements, or, on form or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations.
4. Submittals received from sources other than Contractor or not marked with Contractor's approval will be returned without action.

B. Submittal Schedule
1. Within 20 days after receipt of Notice to Proceed, furnish submittal schedule listing items specified to be furnished for review to Architect including product data, shop drawings, samples, and quality assurance/control submittals.
   a. Coordinate submittal schedule with list of Subcontractors, schedule of values, and Contractor's construction schedule.
   b. Prepare schedule in chronological order, including submittals required during first 90 days of construction. Provide following information -
      1) Scheduled date for first submittal.
      2) Related Section number.
      3) Submittal category.
      4) Name of Subcontractor.
      5) Description of part of the Work covered.
      6) Scheduled date for resubmittal
      7) Scheduled date for Architect's final release or approval.
   c. Schedule shall show 20 days minimum after receipt for review by Architect. If resubmittal is required, an additional 15 days will be allowed for after receipt.
2. Following response to initial submittal, print and distribute copies to Architect, Owner, Subcontractors, and other parties required to comply with submittal dates shown. Post copies in Project meeting room and field office. When revisions are made, distribute to same parties and post in same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
3. Revise schedule after each meeting or activity, where revisions have been recognized or made. Issue updated schedule concurrently with minutes of each meeting.
4. Furnishing of submittal schedule or revision thereto shall not be interpreted as relieving Contractor of his obligation to comply with Contract Document requirements for items on schedule.

C. Product Data1. Collect Product Data, as required by individual Sections, into separate submittals. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as Shop Drawings.
2. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required for Project, mark copies to show applicable information.

3. Do not submit Product Data until compliance with requirements of Contract Documents has been confirmed.
4. Submit preliminary single-copy of Product Data where selection of options by Architect is required.
5. Submit five copies minimum of each required submittal. Architect will retain two and return others marked with action taken and with corrections or modifications required. Unless noncompliance with Contract Document provisions is observed, submittal may serve as final submittal. Insert one marked copy in Owner-provided three-ring binders used to become Operations & Maintenance Manuals specified in Section 01700.
6. Furnish copies of final submittal to Subcontractors and others as required for performance of construction activities. Show distribution on transmittal forms.
    1. Do not proceed with installation until applicable copy of Product Data is in installer's possession.
    2. Do not allow use of unmarked copies of Product Data in connection with construction.

D. Shop Drawings 1. Submit newly prepared graphic data to accurate scale. Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 24 by 36 inches. Highlight, encircle, or otherwise show deviations from Contract Documents. Include following information as a minimum.
    a. Dimensions.
    b. Identification of products and materials included.
    c. Compliance with specified standards.
    d. Notation of coordination requirements.
    e. Notation of dimensions established by field measurement.
2. Do not reproduce Contract Documents or copy standard information as basis of Shop Drawings. Standard information prepared without specific reference to Project is not considered Shop Drawings.
3. Review and designate (stamp) approval of shop drawings. Submit to Architect, with reasonable promptness and in orderly sequence, shop drawings required by Contract Documents. Shop drawings not required by Contract Documents, but requested by Contractor or supplied by Subcontractor need not be submitted to Architect for review. However, these shop drawings shall meet specified shop drawing requirements except those relating to submission to Architect.
    a. Bear cost of reproducing copies of shop drawings required by all concerned. Instead of prints, a sepia may be required.
    b. Shop drawings shall be complete and detailed.
    c. Shop drawings shall be properly identified as specified or as Architect may require.
    d. Provide 6 copies of shop drawings unless required otherwise in specification Section.

E. Samples1. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.
    a. Mount, display, or package Samples so as to ease review of qualities indicated. Prepare Samples to match samples provided by Architect, if applicable. Include following -
        1) Generic description of Sample.
        2) Sample source.
        3) Product name or name of manufacturer.
        4) Compliance with recognized standards.
        5) Availability and delivery time.
    b. Submit Samples for review of kind, color, pattern, and texture, for final check of these characteristics with other elements, and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
        1) Where variations in color, pattern, texture or other characteristics are inherent in material or product represented, submit multiple units (not less

than 3), which show approximate limits of variations.

2) Refer to other specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.

3) Refer to other Sections for Samples to be returned to Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On transmittal, indicate special requests regarding disposition of Sample submittals.

c. Where Samples are for selection of color, pattern, texture, or similar characteristics from a range of standard choices, submit full set of choices for material or product. Preliminary submittals will be reviewed and returned with Architect's mark indicating selection and other action.

d. Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit 3 sets. One will be returned marked with action taken.

e. Samples, as accepted and returned by Architect, shall be used for quality comparisons throughout course of construction.

1) Unless noncompliance with Contract Documents is observed, submittal may serve as final submittal.

2) Sample sets may be used to obtain final acceptance of construction associated with each set.

2. Prepare and distribute additional sets to Subcontractors and others as required for performance of the Work. Show distribution on transmittal forms.

F. Quality Assurance/Control - Quality Assurance/Control submittals are design data, test reports, certificates, manufacturer's instructions, manufacturer's field reports, and other documentary data affirming quality of products and installations. Submit 2 copies to Architect immediately upon receipt.

G. Architect's Action

1. Allow 21 days for Architect's review and return for initial submittals and 10 days for re-submittals.

2. Submittals reviewed by Architect will be identified as having received such review by being so stamped and dated.

a. Where submittals are marked 'Approved,' that part of the Work covered by submittal may proceed provided it complies with requirements of Contract Documents. Final acceptance will depend upon that compliance.

b. When submittals are marked 'Approved as Noted,' that part of the Work covered by submittal may proceed provided it complies with notations or corrections on submittal and requirements of Contract Documents. Final acceptance will depend on that compliance.

c. When submittal is marked 'Not Approved, Revise and Resubmit,' do not proceed with that part of the Work covered by submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare new submittal according to notations and resubmit without delay at no additional cost to Owner. Repeat as necessary to obtain satisfactory action mark. Do not allow submittals marked 'Not Approved, Revise and Resubmit' to be used at Project site, or elsewhere where the Work is in progress.

d. Where submittal is primarily for information or record purposes, special processing, or other activity, submittal will be returned, marked 'Action Not Required.'

3. Two copies of each submittal will be retained in Architect's office until completion of Project.

4. Except for submittals for record, information, or similar purposes, where action and return are required or requested, Architect will review each submittal, mark to show action taken, and return promptly to Contractor.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 400

QUALITY CONTROLS

PART 1 - GENERAL

1.1 REGULATORY REQUIREMENTS

A. Asbestos:
1. Contract Documents for this Project have been prepared in accordance with generally accepted professional architectural and engineering practices. Accordingly, no asbestos or products containing asbestos have been knowingly specified for this Project. Notify Architect immediately for instructions if:
   a. Materials containing asbestos are brought to site for inclusion in the Work.
   b. Asbestos containing materials are encountered in existing structures upon which work is being done.
2. At Architect's direction and with Owner's approval, a certified asbestos inspector will collect samples and an independent testing laboratory will perform testing procedures on suspect materials.
3. Certify that based upon best knowledge, information, inspection, and belief no building materials containing asbestos were used in construction of Project. Submit certification on form provided by Owner.

1.2 REFERENCES

A. Reference Standards:
1. Industry Standards:
   a. Except where Contract Documents specify otherwise, construction industry standards will apply and are made a part of Contract Documents by reference.
   b. Where compliance with two or more standards is specified and standards apparently establish different or conflicting requirements for minimum quantities or quality levels, refer to Architect for decision before proceeding. Quantity or quality level shown or specified will be minimum provided or performed. Actual installation may comply exactly with minimum quantity or quality specified, or it may exceed minimum within reasonable limits. In complying with these requirements, indicated numeric values are minimum or maximum, as appropriate for context of requirements. Refer uncertainties to Architect for decision before proceeding.
   c. Each entity engaged in construction on Project is required to be familiar with industry standards applicable to that entity's construction activity. Copies of applicable standards are not bound with Contract Documents. Where copies of standards are needed for performance of a required construction activity, Contractor will obtain copies directly from publication source.
   d. Trade Assoc names and titles of general standards are frequently abbreviated. The following acronyms or abbreviations, as referenced in Contract Documents, are defined to mean associated names. Names and addresses are subject to change and are believed to be, but are not assured to be, accurate and up to date as of date of Contract Documents.

AABC	Associated Air Balance Council	Washington	DC	(202) 737-0202	www.aabchq.com
AAMA	American Architectural Manufacturers Assoc	Schaumburg	IL	(847) 303-5859	www.aamanet.org
AASHTO	American Assoc of State Highway & Transportation Officials	Washington	DC	(202) 624-5800	www.aashto.org
ACI	American Concrete Inst In-ternational	Farmington Hills	MI	(248) 848-3700	www.aci-int.org

AGA	American Gas Assoc	Washington	DC	(202) 824-7000	www.aga.org
AIA	American Inst of Architects	Washington	DC	(202) 626-7300	www.aiaonline.com
AISC	American Inst of Steel Construction	Chicago	IL	(312) 670-2400	www.aisc.org
AISI	American Iron & Steel Inst	Washington	DC	(202) 452-7100	www.steel.org
AITC	American Inst of Timber Construction	Englewood	CO	(303) 792-0669	
AMCA	Air Movement & Control Assoc International	Arlington Heights	IL	(847) 394-0150	www.amca.org
ANSI	American National Standards Inst	New York	NY	(212) 642-4900	www.ansi.org
APA	Engineered Wood Assoc	Tacoma	WA	(253) 565-6600	www.apawood.org
API	American Petroleum Inst	Washington	DC	(202) 682-8000	www.api.org
ARI	Air Conditioning & Refrigeration Inst	Arlington	VA	(703) 524-8800	www.ari.org
ASHRAE	American Society of Heating, Refrigerating, & Air-Conditioning Engineers	Atlanta	GA	(404) 636-8400	www.ashrae.org
ASME	American Society of Mechanical Engineers International	New York	NY	(800) 843-2763	www.asme.org
ASTM	American Society for Testing & Materials	West Conshohocken	PA	(610) 832-9585	www.astm.org
AWI	Architectural Woodwork Inst	Reston	VA	(703) 733-0600	www.awinet.org
AWPA	American Wood Preservers' Assoc	Granbury	TX	(817) 326-6300	www.awpa.com
AWS	American Welding Society	Miami	FL	(800) 443-9353	www.amweld.org
AWWA	American Water Works Assoc	Denver	CO	(303) 794-7711	www.awwa.org
BHMA	Builders Hardware Manufacturers Assoc	New York	NY	(212) 297-2100	www.buildershardware.com
BIA	Brick Industry Assoc	Reston	VA	(703) 620-0010	www.bia.org
CFI	International Certified Floorcovering Installers Assoc	Kansas City	MO	(816) 231-4646	www.cfi-installers.org
CRI	Carpet & Rug Inst	Dalton	GA	(800) 882-8846	www.carpet-rug.com
CRSI	Concrete Reinforcing Steel Inst	Schaumburg	IL	(847) 517-1200	www.crsi.org
CISPI	Cast Iron Soil Pipe Inst	Chattanooga	TN	(423) 892-0137	
DHI	Door & Hardware Inst	Chantilly	VA	(703) 222-2010	www.dhi.org
EIMA	EIFS Industry Members Assoc	Morrow	GA	(800) 294-3462	www.eifsfacts.com
FM	FM Global	Johnston	RI		www.fmglobal.com
GA	Gypsum Assoc	Washington	DC	(202) 289-5440	www.gypsum.org
HPVA	Hardwood Plywood & Veneer Assoc	Reston	VA	(703) 435-2900	www.hpva.org
ICBO	International Conference of Building Officials	Whittier	CA	(800) 423-6587	www.icbo.org
ISSA	International Slurry Surfacing Assoc	Washington	DC	(202) 857-1160	www.slurry.org
LPI	Lightning Protection Inst	Arlington Heights	IL	(800) 488-6864	www.lightning.org
MFMA	Maple Flooring Manufacturers' Assoc	Northbrook	IL	(847) 480-9138	www.maplefloor.org
MSS	Manufacturer's Standardization Society of The Valve and Fittings Industry	Vienna	VA	(703) 281-6613	www.mss-hq.com
NAAMM	National Assoc of Architectural Metal Manufacturers	Chicago	IL	(312) 332-0405	www.naamm.org

NEC	National Electric Code	(from NFPA).			
NEMA	National Electrical Manufac-turer's Assoc	Rosslyn	VA	(703) 841-3200	www.nema.org
NFPA	National Fire Protection Assoc	Quincy	MA	(800) 344-3555	www.nfpa.org
NFRC	National Fenestration Rating Council	Silver Spring	MD	(301) 589-6372	www.nfrc.org
NSF	NSF International	Ann Arbor	MI	(734) 769-8010	www.nsf.org
PCA	Portland Cement Assoc	Skokie	IL	(847) 966-6200	www.portcement.org
PCI	Precast / Prestressed Con-crete Inst	Chicago	IL	(312) 786-0300	www.pci.org
PEI	Porcelain Enamel Inst	Nashville	TN	(615) 385-5357	www.pocelainenamel.com
SDI	Steel Deck Inst	Fox River Grove	IL	(847) 462-1930	www.sdi.org
SDI	Steel Door Inst	Cleveland	OH	(440) 899-0010	www.steeldoor.org
SIGMA	Sealed Insulating Glass Manufacturer's Assoc	Chicago	IL	(312) 644-6610	
SJI	Steel Joist Inst	Myrtle Beach	SC	(843) 626-1995	www.steeljoist.org
SMACNA	Sheet Metal & Air Condition-ing Contractors National Assoc	Chantilly	VA	(703) 803-2980	www.smacna.org
SPIB	Southern Pine Inspection Bureau	Pensacola	FL	(850) 434-2611	
SSMA	Steel Stud Manufacturer's Assoc	Chicago	IL	(312) 332-0405	www.ssma.com
TCA	Tile Council of America	Anderson	SC	(864) 646-8453	www.tileusa.com
TPI	Truss Plate Inst	Madison	WI	(608) 833-5900	
UL	Underwriters Laboratories	Northbrook	IL	(847) 272-8800	www.ul.com
WDMA	Window and Door Manufac-turer's Assoc	Des Plaines	IA	(847) 299-5200	www.nwwda.org
WWPA	Western Wood Products Assoc	Portland	OR	(503) 224-3930	www.wwpa.org

2. Federal Government Agencies: Names and titles of federal government standard or specification producing agencies are often abbreviated. Following acronyms or abbreviations referenced in Contract Documents represent names of standard or specification producing agencies of federal government. Names and addresses are subject to change but are believed to be, but are not assured to be, accurate and up to date as of date of Contract Documents.

CS	Commercial Standard (U S Department of Commerce)	Washington	DC	(202) 512-0000	www.doc.gov
EPA	Environmental Protection Agency	Washington	DC	(202) 260-2090	www.epa.gov
FCC	Federal Communications Commission	Washington	DC	(202) 418-0126	www.fcc.gov
FS	Federal Specifications Unit (Available from GSA)	Washington	DC	(202) 619-8925	www.gsa.gov
MIL	Military Standardization Documents (U S Department of Defense)	Philadelphia	PA	(215) 697-2179	www.dod.gov
OSHA	Occupational Safety & Health Administration (U S Department of Labor)	Washington	DC	202) 219-8148	www.osha.gov
PS	Product Standard of NBS (U S Department of Commerce)	Washington	DC	(202) 512-1800	www.doc.gov

B. Governing Regulations / Authorities:

1. Contact authorities having jurisdiction directly for information and decisions having a bearing on the Work.

2. Obtain copies of regulations required to be retained at Project Site, available for reference by parties who have a reasonable need for such reference.

1.3 QUALITY CONTROL

A. Field Quality Control Procedures:
   1. Inspection and testing by Owner, Architect, Contractor, their consultants or government agencies to examine Work performed by Contractor does not relieve Contractor of responsibility for compliance with Contract Documents.
   2. Quality control services include inspections, tests and related actions including reports, performed by Contractor. They do not include inspections, tests or related actions performed by Architect, Owner, governing authorities or independent agencies hired by Owner or Architect.
      a. Contractor and each agency engaged to do inspections, tests, and similar services will coordinate sequence of activities to accommodate required services with minimum of delay. In addition, Contractor and each agency will coordinate activities to avoid necessity of removing and replacing construction to accommodate inspections and tests. Contractor is responsible for scheduling times for inspections, tests, taking samples, and similar activities.
      b. Provide inspections, tests, and similar quality control services specified in individual specification Sections or required by governing authorities.
      c. Where results of inspections, tests, or similar services show that the Work does not comply with Contract Document requirements, correct the deficiencies in the Work.
      d. Cooperate with agencies performing required inspections, tests, and similar services and provide reasonable auxiliary services as requested. Notify agency sufficiently before operations to allow assignment of personnel. Auxiliary services required include but are not limited to -
         1) Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.
         2) Taking adequate quantities of representative samples of materials that require testing or helping agency in taking samples.
         3) Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
         4) Providing agency with preliminary design mix proposed for use for materials mixes that require control by testing agency.
         5) Securing and protecting samples and test equipment at Project site.
   3. Upon completion of inspection, testing, sample-taking, and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes. Comply with Contract Documents in making such repairs.
   4. Protect construction exposed by or for quality control service activities, and protect repaired construction.
   5. Repair and protection is Contractor's responsibility, regardless of who caused the inspection, testing, or similar services.

B. Testing And Inspecting Services:
   1. Engage inspection and testing service agencies, including independent testing laboratories, only with written approval of Architect. Each independent inspection and testing agency engaged on Project will be licensed and authorized to operate in the jurisdiction in which Project is located.
   2. Duties of Testing Agency:
      a. Independent testing agency engaged to perform inspections, sampling, and testing of materials and construction specified in individual specification Sections will cooperate with Architect and Contractor in performance of its duties and will provide qualified personnel to perform required inspections and tests.
      b. Agency will notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
      c. Agency is not authorized to release, revoke, alter, or enlarge requirements of Contract Documents, or approve or accept any portion of the Work.
      d. Agency will not perform any duties of Contractor.
   3. Submittals:

a. Independent testing agency will submit certified written report of each inspection, test, or similar service, to Architect, in duplicate, unless Contractor is responsible for service. If Contractor is responsible for service, submit certified written report of each inspection, test, or similar service through Contractor, in duplicate.
   1) Submit additional copies of each written report directly to governing authority, when authority so directs.
   2) Written reports of each inspection, test, or similar service will include, but not be limited to:
      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 interpretations of test results.
      j) Ambient conditions at time of sample-taking and testing.
      k) Comments or professional opinion as to whether inspected or tested Work complies with Contract Document requirements.
      l) Name and signature of laboratory inspector.
      m) Recommendations on retesting.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 01 500

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 ADMINISTRATIVE REQUIREMENTS

A. Where necessary, engage appropriate local utility companies to install temporary service or connect to existing service. Where utility company provides only part of service, provide remainder with matching, compatible materials and equipment. Comply with utility company's recommendations.
   1. Comply with industry standards and applicable laws and regulations of authorities having jurisdiction.
   2. Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.
   3. Arrange with utility company and existing users for time when service can be interrupted, where necessary, to make connections for temporary services.
   4. Provide adequate capacity at each stage of construction. Before temporary utility availability, provide trucked-in services.
   5. Obtain construction easements necessary to bring temporary and/or permanent utilities to site.
   6. Use qualified personnel for installation and maintenance of temporary facilities. Locate facilities where they will serve Project adequately and result in minimum interference with the Work of Owner or other Contractors on Project Site. Relocate and modify facilities as required.
   7. Pay cost and use charges for temporary facilities and utilities.

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

C. Keep temporary services and facilities clean and neat in appearance. Operate in safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or allow them to interfere with progress of The Work. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on Project site.

D. Limit availability of temporary facilities to essential and intended uses to reduce waste and abuse.

E. 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 day basis where required to achieve indicated results and to avoid possibility of damage.
   2. Prevent water filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

F. Remove each temporary facility and control when need has ended, or when replaced by authorized use of permanent facility, or by Substantial Completion. Complete permanent construction that may have been delayed because of interference with temporary facility. Repair damaged work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
   1. Materials and facilities that make up temporary facilities are property of Contractor.
   2. By Substantial Completion, clean and renovate permanent facilities used during construction period, including but not limited to:
      a. Replace air filters and clean inside of ductwork and housings.
      b. Replace significantly worn parts and parts subjected to unusual operating conditions.
      c. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

3.1 TEMPORARY UTILITIES:

A. Temporary Electric Power: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period.

B. Temporary Fire Protection:
   1. Install and maintain temporary fire protection facilities of types needed to protect against predictable and controllable fire losses. At a minimum, provide and maintain in working order two Standard UL Labeled ABC all-purpose 10 lb fire extinguishers. Do not incorporate these extinguishers into final Project.
   2. Locate fire extinguishers where convenient and effective for their intended purpose.
   3. Store combustible materials in containers in fire-safe locations.
   4. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways, and other access routes for fighting fires.
   5. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.
   6. At earliest feasible date in each area of Project, complete installation of permanent fire protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

C. Heating, Cooling, And Ventilating:
   1. Install and operate temporary heating, cooling, and ventilating units including fuel, temporary piping, fittings, wiring, and connections necessary to provide environmental conditions specified for various portions of the Work. Coordinate ventilation requirements to produce ambient conditions required and reduce consumption of energy.
   2. Repair damage to building and contents caused by cold, heat, dampness, and/or heating, cooling, and ventilating equipment. Select equipment that will not have harmful effect on completed installations or on elements being installed.
   3. Maintain safe conditions for use of temporary heating, cooling, and ventilating systems including, but not limited to, following requirements:
      a. Operate equipment according to equipment manufacturer's instructions.
      b. Provide fresh air ventilation required by equipment manufacturer.
      c. Keep temperature of fuel containers stabilized.
      d. Secure fuel containers from overturning.
      e. Operate equipment away from combustible materials.
   4. Permanent mechanical system may be operated subject to the following conditions:
      a. Do not operate system when work causing air-borne dust is occurring or when dust caused by such work is present without installation of temporary filtering system approved by Architect.
      b. Operate system at no cost to Owner, including cost of fuel.
      c. Assume all responsibility and risk for operation of system.
      d. Return permanent mechanical equipment to 'like-new' condition for Substantial Completion Inspection.

D. Temporary Lighting: Install and operate temporary lighting that will provide adequate illumination for construction operations and traffic conditions.

E. Temporary Telephones
   1. Provide temporary telephone service for all personnel engaged in construction activities, throughout construction period.
   2. Contractor will pay for Local calls. Party making call will pay for long-distance and toll calls.
   3. At each telephone, post list of important telephone numbers.

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

3.2 CONSTRUCTION FACILITIES:

A. Field Offices:
   1. Provide and maintain insulated, weather tight temporary office of sufficient size to accommodate Contractor's personnel at Project site and for use by Owner, Architect and Subcontractors.
   2. Keep office clean and orderly.
   3. Heat and cool office as needed.
   4. Furnish office with locking door, light(s), table(s), bench(es), rack(s) for drawings, telephone, and FAX machine.
   5. Make office available for progress meetings.
   6. If Owner agrees to permit removal of temporary office before Substantial Completion, Contractor may use a room as an office after temporary office is removed. Equip room as specified above and restore to 'like-new' condition before Substantial Completion.

B. Sanitary Facilities:
   1. Provide temporary sanitary toilet.
   2. Service and maintain temporary toilet in a clean, sanitary condition.

3.3 CONSTRUCTION AIDS:

A. Scaffolding, Platforms, Stairs, Etc:
   1. Furnish and maintain equipment such as temporary stairs, ladders, ramps, platforms, scaffolds, hoists, runways, derricks, chutes and elevators as required for proper execution of The Work.
   2. Apparatus, equipment, and construction will meet requirements of applicable laws and safety regulations.

3.4 VEHICULAR ACCESS AND PARKING:

A. Temporary Access Roads:

B. Haul Routes:

C. Temporary Parking Areas:

D. Temporary Roads:

E. Traffic Control:

F. Staging Areas:

3.5 TEMPORARY BARRIERS AND ENCLOSURES:

A. General:
   1. Protection Of Existing Improvements: Protect streets, private roads, and sidewalks, including overhead protection where required. Repair damage to existing improvements caused by construction activities.
   2. Protection Of Adjacent Property: Provide necessary protection for adjacent property and lateral support thereof.

B. Temporary Barricades:
   1. Comply with standards and code requirements in erecting barricades, warning signs, and lights.

2. Take necessary precautions to protect persons, including members of the public, from injury or harm.

C. Temporary Fencing: Before construction begins, install 6 foot high enclosure fence with lockable entrance gates. Locate where shown on Drawings. If not shown on Drawings, enclose entire site or portion sufficient to accommodate construction operations.

D. Temporary Protective Walkways: Erect structurally adequate protective covered walkway for passage of persons along adjacent Public Street if shown on drawings or required by applicable laws. Coordinate with entrance gates, other facilities and obstructions.

E. Temporary Security Barriers:
1. Install temporary enclosures of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and other violations of security.
2. Secure materials and equipment stored on site.
3. Maintain exterior building security until Substantial Completion
4. Secure building at the end of each work day.

F. Temporary Tree And Plant Protection:
1. Before commencing site work, build and maintain protective fencing around existing trees and vegetation as shown on the drawings.
2. Individual trees will have protective fencing built beyond drip line.
3. Build protective fencing around groups of trees and other vegetation as indicated on Drawings.
4. Keep areas within protective fencing undisturbed and do not use for any purpose.
5. Remove and replace vegetation that dies or is damaged beyond repair due to construction activities.

3.6 TEMPORARY CONTROLS:

A. Temporary Erosion And Sediment Control:
1. Take precautions necessary to prevent erosion and transportation of soil downstream, to adjacent properties, and into on-site or off-site drainage systems.
2. Develop, install, and maintain an erosion control plan if required by law.
3. Repair and correct damage caused by erosion.

B. Temporary Environmental Controls:
1. Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and reduce possibility that air, waterways, and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment that produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near site.
2. Provide protection against weather (rain, winds, storms, frost, or heat) to maintain all work, materials, apparatus, and fixtures free from injury or damage.
3. Protect excavation, trenches, and building from damage from rain water, spring water, ground water, backing up of drains or sewers, and all other water. For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with requirements of applicable local regulations. Where feasible, use permanent facilities. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities. Filter out excessive amounts of soil, construction debris, chemicals, oils and similar contaminants that might clog sewers or pollute waterways before discharge.
4. Comply with governing ordinances relating to weed control and removal.

3.7 PROJECT IDENTIFICATION

A. Temporary Project Signage:

1. Contractor may, at its option, erect a temporary project identification sign. Sign may be free-standing or attached to temporary field office or storage shed. No other signs or advertisements are allowed on building site.
2. Owner reserves right to remove and/or take possession of any Project identification sign.
3. Provide a temporary Project Identification sign. Sign may be free-standing or attached to temporary field office or storage shed. No other signs or advertisements are allowed on building site.
4. Sign will be no larger than 4 feet by 8 feet and include following information:
   a. Project Name as shown in Contract Documents.
   b. Contractor's name.
   c. Architectural firm name.
5. Owner reserves the right to remove and/or take possession of any Project identification sign.

END OF SECTION

SECTION 01600

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Administrative and procedural requirements governing Contractor's selection of products for use in Project.

B. Related Sections
   1. Section 01300, Submittals - Contractor's Construction Schedule and Schedule of Submittals

C. Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products that will be exposed to view in occupied spaces or on building exterior.
   1. Locate required product labels and stamps on concealed surface or, where required for observation after installation, on accessible surface that is not conspicuous.
   2. Provide permanent nameplates on items of service-connected or power-operated equipment. Locate on easily accessible surface that is inconspicuous in occupied spaces. Nameplate shall contain following information and other essential operating data -
      a. Name of product and manufacturer.
      b. Model and serial number.
      c. Capacity.
      d. Speed.
      e. Ratings.

1.2 PRODUCT DELIVERY, STORAGE, & HANDLING

A. Deliver, store, and handle products according to manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.
   1. Schedule delivery to reduce long-term storage at site and to prevent overcrowding of construction spaces.
   2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
   3. Deliver products to site in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
   4. Inspect products upon delivery to ensure compliance with Contract Documents, and to ensure that products are undamaged and properly protected.
   5. Store products at site in manner that will simplify inspection and measurement of quantity or counting of units.
   6. Store heavy materials away from Project structure so supporting construction will not be endangered.
   7. Store products subject to damage by elements above ground, under cover in weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS

A. When option of selecting between two or more products is given, product selected shall be compatible with products previously selected, even if previously selected products were also

options.

B. Provide products that comply with Contract Documents, that are undamaged, and unless otherwise indicated, new and unused at time of installation. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for complete installation and for intended use and effect.

C. Product selection is governed by Contract Documents and governing regulations, not by previous Project experience. Procedures governing product selection include

1. Substitutions -
   a. Where the heading ‘Approved Manufacturers’ is used to identify the list of specificied products or manufacturers and statement 'Equal as approved by Architect before bidding. See Section 01600' is not included, provide only one of products specified. No substitutions or mixing of manufacturers’ products will be allowed.
   b. Where the heading ‘Acceptable Manufacturers’ is used to identify the list of specified products or manufacturers and the statement 'Equal as approved by Architect before bidding. See Section 01600' is included, use the specified products and manufacturers unless approval to use other products and manufacturers has been obtained by Addendum after following the requirements in the Instructions To Bidders relative to substitutions.
2. Where specifications describe a product or assembly by specifying exact characteristics required, with or without use of brand or trade name, provide product or assembly that provides specified characteristics and otherwise complies with Contract requirements.
3. Where Specifications require compliance with performance requirements, provide products that comply with these requirements and are recommended by manufacturer for application described. General overall performance of product is implied where product is specified for specific application. Manufacturer's recommendations may be contained in published product literature, or by manufacturer's certification of performance.
4. Where specifications only require compliance with an imposed code, standard, or regulation, select product that complies with standards, codes or regulations specified.
5. Where Specifications require matching an established Sample, Architect's decision will be final on whether proposed product matches satisfactorily. Where no product available within specified category matches satisfactorily nor complies with other specified requirements, refer to Architect.
6. Where specified product requirements include phrase ` . . . as selected from manufacturer's standard colors, patterns, textures . . . ' or similar phrase, select product and manufacturer that comply with other specified requirements. Architect will select color, pattern, and texture from product line selected.
7. Remove and replace products and materials not specified in Contract Documents but installed in the Work with specified products and materials at no additional cost to Owner and for no increase in Contract time.

2.2 OWNER FURNISHED PRODUCTS

A. Install items furnished by Owner or receive and store in safe condition items purchased direct by Owner according to requirements of Contract Documents.

PART 3 EXECUTION

3.1 INSTALLATION OF PRODUCTS

A. Anchor each product securely in place, accurately located, and aligned with other Work.

B. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration until time of Substantial Completion.

END OF SECTION

SECTION 01700

EXECUTION REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Administrative and procedural requirements for installation and cleaning.
   2. Administrative and procedural requirements for project closeout, including
      a. Project record document submittal.
      b. Operations & maintenance manual submittal.
      c. Submittal of warranties.

B. Related Sections
   1. Closeout requirements for specific construction activities are included in appropriate Sections.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 PREPARATION

A. Bracing, Shoring, & Sheathing - Design, furnish, and install all shoring, bracing, and sheathing as required for safety and for proper execution of the Work and have same removed if required when the Work is completed.

3.2 GENERAL INSTALLATION PROVISIONS

A. Inspection of Conditions - Require installer of each major component to inspect both substrate and conditions under which Work is to be done. Notify Architect in writing of unsatisfactory conditions. Do not proceed until unsatisfactory conditions have been corrected.

B. Manufacturer's Instructions - Comply with Manufacturer's installation instructions and recommendations, to extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.

C. Inspect materials or equipment immediately upon delivery and again before installation. Reject damaged and defective items.

D. Provide attachment and connection devices and methods necessary for securing Work. Secure work true to line and level. Allow for expansion and building movement.

E. Visual Effects - Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain best visual effect. Refer questionable choices to Architect for final decision.

F. Recheck measurements and dimensions before starting each installation.

G. Install each component during weather conditions and Project status that will ensure best possible results. Isolate each part of completed construction from incompatible material as necessary to prevent deterioration.

H. Coordinate temporary enclosures with required inspections and tests, to reduce necessity of uncovering completed construction for that purpose.

I. Mounting Heights - Where mounting heights are not shown, install individual components at standard mounting heights recognized within the industry or local codes for that application. Refer questionable mounting height decisions to Architect for final decision.

3.3 CLEANING

A. Progress Cleaning
1. Comply with regulations of authorities having jurisdiction and safety standards for cleaning.
2. Keep premises broom clean during progress of the Work.
3. During handling and installation, protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from soiling, damage, or deterioration until Substantial Completion.
4. Clean and maintain completed construction as frequently as necessary throughout construction period. Adjust and lubricate operable components to ensure ability to operate without damaging effects.
5. Supervise construction activities to ensure that no part of construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.
6. Before and during application of painting materials, clear area where such work is in progress of debris, rubbish, and building materials that may cause dust. Sweep floors and vacuum as required and take all possible steps to keep area dust free.
7. Collection & Disposal of Waste -
   a. Remove waste materials and rubbish caused by employees, Subcontractors, and contractors under separate contract with Owner and dispose of legally. Remove unsuitable or damaged materials and debris from building and from property.
      1) Provide adequate waste receptacles and dispose of materials when full.
      2) Properly store volatile waste and remove daily.
      3) Do not deposit waste into storm drains, sanitary sewers, streams, or waterways. Do not discharge volatile, harmful, or dangerous materials into drainage systems.
   b. Do not burn waste materials. Do not bury debris or excess materials on Owner's property.
8. Where extra materials of value remaining after completion of associated Work have become Owner's property, arrange for disposition of these materials as directed.

B. Final Cleaning
1. Clean each surface or unit to condition expected in normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions. Remove all rubbish from under and about building and leave building clean and habitable.
2. In addition to general cleaning noted above, perform cleaning for all trades at completion of work in areas where construction activities have occurred, including -
   a. Interior -
      1) Wash and polish inside glazing, exercising care not to scratch glass. Replace chipped or broken glass and other damaged glazing materials.
      2) Remove marks, stains, fingerprints and other soil, and dirt from painted, decorated, and stained work.
      3) Clean and polish woodwork.
      4) Remove labels that are not permanent labels.
      5) Clean and polish hardware for all trades. This shall include removal of stains, dust, dirt, paint, etc.
      6) Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean light fixtures and lamps.
      7) Clean other fixtures and equipment and remove stains, paint, dirt, and dust.
      8) Remove temporary floor protection and clean floors.
      9) Clean metal surfaces, including doors and windows, required to have polished finishes. Polish surfaces, leaving them without fingerprints or other blemishes.
3. If Contractor fails to clean up, Owner may do so and charge cost to Contractor.

3.5 CLOSEOUT PROCEDURES

A. Pre-Substantial Completion Inspections
   1. Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in request.
      a. Notify Architect in writing when items have been corrected and receive Architect's verification of correction of items.
      b. In Payment Request that coincides with or first follows date Substantial Completion is claimed, show 100 percent completion for the Work. Include supporting documentation for completion as specified in Contract Documents and statement showing accounting of changes to Contract Sum.
      c. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, equipment check-out sheets, and similar documents.
      d. Obtain and submit releases enabling Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
      e. Submit record drawings, maintenance manuals, final project photographs, damage or settlement survey, property survey, and similar final record information.
      f. Deliver tools, spare parts, extra stock, and similar items.
      g. Make final change-over of permanent locks and transmit keys to Owner. Advise Owner's personnel of change-over in security provisions.
      h. Complete start-up testing of systems, and instruction of Owner's maintenance personnel. Discontinue or change over and remove temporary facilities from site, along with construction tools, mock-ups, and similar elements.
      i. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.
   2. Upon completion of Project, request a Pre-Substantial Completion Inspection in writing. Completion of Project shall be stated in Contractor's Construction Schedule specified in Section 01300 and shall leave sufficient time between completion of Project and expiration of Contract time to allow correction of work.
   3. On receipt of request for inspection, Owner and Architect and his consultants will schedule and conduct a Pre-Substantial Completion Inspection in presence of Contractor's designated representative, or will advise Contractor of known requirements to be completed before scheduling of Pre-Substantial Completion Inspection. List of items to be corrected by Contractor will be furnished to Contractor within two days after Pre-Substantial Completion Inspection.
   4. Architect will repeat inspection when requested and assured that the Work has been substantially completed.
   5. Results of the completed Pre-Substantial Completion Inspection will form the basis of requirements for final acceptance.

B. Substantial Completion Inspection
   1. Upon receipt of notice that the Work is complete except items whose completion has been delayed because of circumstances acceptable to Architect, Architect will arrange substantial completion inspection to include Owner's representatives. Architect will also notify Contractor and Owner in writing of time and place of inspection. Upon completion of inspection, unless building is rejected, Architect will prepare a certificate of final acceptance. Owner, Architect, and Contractor will execute a Certificate of Substantial Completion that states dates for -
      a. User occupancy
      b. Commencement of warranties
      c. Final acceptance meeting
      d. Modifications to amount assessed for liquidated damages
   2. After inspection and if necessary, Architect will furnish final list of items to be corrected.

C. Final Acceptance Meeting
   1. Before requesting final inspection for certification of final acceptance and final payment, complete following. List exceptions in request.
      a. Submit final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products

and completed operations where required.

b. Submit updated final statement, accounting for final additional changes to Contract Sum.

c. Submit certified copy of Architect's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and list has been endorsed and dated by Architect.

d. Submit final meter readings for utilities, measured record of stored fuel, and similar data as of date of Substantial Completion, or when Owner took possession of and responsibility for corresponding elements of the Work.

e. Submit consent of surety to final payment.

f. Submit final liquidated damages settlement statement.

2. Final acceptance meeting will ensure that deficiencies noted at substantial completion inspection have been corrected according to terms of Substantial Completion Certificate.

3. When all items have been corrected, Architect will issue a letter to Owner authorizing final payment.

4. If all items have not been corrected as agreed, Owner may elect to complete the Work under provisions of the General Conditions.

3.6 CLOSEOUT SUBMITTALS

A. General

1. Refer to other specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work. Immediately before date of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to Architect for Owner's records.

2. Final payment for Project will not be made until closeout submittals have been completed, submitted, and approved.

B. Operations & Maintenance Manuals

1. Owner will deliver to Contractor set of binders prepared to receive Operations & Maintenance Data and Product Data to be submitted during course of construction.

2. Include following information in Meetinghouse Operations & Maintenance Manuals -

a. Copy of complete Project Manual including addenda and copies of other written construction documents such as Change Orders and interpretations issued during construction.

1) Mark these documents to show variations in actual Work performed in comparison with text of specifications and Modifications. Show substitutions, selection of options, and similar information, particularly on elements that are concealed or cannot otherwise be readily discerned later by direct observation.

2) Note related record drawing information and Product Data.

c. Product Data - One copy of each Product Data submittal as specified in Section 01300.

d. Operations & maintenance manuals required by Divisions and Sections of the specifications.

e. Certifications.

f. Copies of specified warranties.

C. Preventative Maintenance Instructions

1. Arrange for each installer of equipment that requires regular maintenance to meet with Owner's personnel to provide instruction in proper operation and maintenance as specified in specification Sections. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include detailed reviews of following items

a. Maintenance manuals.

b. Record documents.

c. Spare parts and materials.

d. Tools.

e. Lubricants.

f. Fuels.

g. Identification systems.
h. Control sequences.
i. Hazards.
j. Cleaning.
k. Warranties and bonds.
l. Maintenance agreements and similar continuing commitments.

2. As part of instruction for operating equipment, demonstrate following procedures
   a. Start-up.
   b. Shutdown.
   c. Emergency operations.
   d. Noise and vibration adjustments.
   e. Safety procedures.
   f. Economy and efficiency adjustments.
   g. Effective energy use.

D. Project Record Documents

1. Do not use record documents for construction purposes. Protect from deterioration and loss in secure, fire-resistive location. Provide access to record documents for Architect's reference during normal working hours.
2. Maintain clean, undamaged set of blue or black line white-prints of Contract Drawings. Mark set to show actual installation where installation varies from the Work as originally shown. Give particular attention to concealed elements that would be difficult to measure and record at later date.
   a. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work.

b. Mark new information that is important to Owner, but was not shown on Contract Drawings.
c. Note related Change Order numbers where applicable.
d. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on cover of each set.

E. Warranties
1. When written guarantees beyond one year after substantial completion are required of any Section of the Work, Contractor shall secure such guarantees and/or warranties properly addressed and signed and in favor of Owner. Include these documents in Meetinghouse Operations & Maintenance Manuals specified above.
2. Delivery of guarantees and warranties shall not relieve Contractor from any obligation assumed under any other provisions of his contract.
3. Nothing in this Section intends or implies that guarantees and/or warranties shall apply to work abused or neglected by Owner.

END OF SECTION

SECTION 02001

GENERAL SITE WORK REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. General procedures and requirements for Site Work.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 EXAMINATION

A. Site Verification Of Conditions
   1. 48 hours minimum prior to performing any work on site, contact USA (Underground Service Alert) to arrange for utility location services.
   2. Pothole to verify location of existing various underground facilities at sufficient locations to assure that no conflict with the proposed work exists and sufficient clearance is available to avoid damage to existing facilities.
   3. Perform potholing at least 10 working days in advance of performing any excavation or underground work.
   4. Upon discovery of conflicts or problems with existing facilities, notify Architect by phone or fax within 24 hours. Follow telephone or fax notification with letter and diagrams indicating conflict or problem and sufficient measurements and details to evaluate problem.

3.2 PREPARATION

A. Protection
   1. Spillage -
      a. Avoid spillage by covering and securing loads when hauling on or adjacent to public streets or highways.
      b. Remove spillage and sweep, wash, or otherwise clean project, streets, and highways.
   2. Dust Control -
      a. Take precautions necessary to prevent dust nuisance, both on-site and adjacent to public and private properties.
      b. Correct or repair damage caused by dust.
   3. Erosion Control -
      a. Take precautions necessary to prevent erosion and transportation of soil downstream, to adjacent properties, and into on-site or off-site drainage systems.
      b. Develop, install, and maintain an erosion control plan if required by law.
      c. Repair and correct damage caused by erosion.
   4. Existing Plants & Features - Do not damage tops, trunks, and roots of existing trees and shrubs on site which are intended to remain. Do not use heavy equipment within branch spread. Interfering branches may be removed only with permission of Architect. Do not damage other plants and features which are to remain.

B. If specified precautions are not taken or corrections and repairs made promptly, Owner may take such steps as may be deemed necessary and deduct costs of such from monies due to Contractor. Such action or lack of action on Owner's part does not relieve Contractor from responsibility for proper protection of the Work.

3.3 REPAIR/RESTORATION

A. Adjust existing covers, boxes, and vaults to grade.

B. Replace broken or damaged covers, boxes, and vaults.

C. Independently confirm size, location, and number of covers, boxes, and vaults which require adjustment.

3.4 FIELD QUALITY CONTROL

A. If work has been interrupted by weather, scheduling, or other reason, notify Architect 24 hours minimum prior to intended resumption of grading or compacting.

B. Owner reserves right to require additional testing to re-affirm suitability of completed work including compacted soils which have been exposed to adverse weather conditions.

END OF SECTION

SECTION 02110

SITE CLEARING

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Prepare site for rough grading and structure excavation as described in Contract Documents.

B. Related Sections
   1. Section 02001 - General Sitework Requirements
   2. Section 02212 - Finish grading of existing topsoil stored on site and addition of imported topsoil.

1.2 DEFINITIONS

A. Existing topsoil is defined as total amount of soil stripped less vegetation layer stripped as specified in Article 3.3 below.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine site to determine type of problems to be encountered.

3.2 PERFORMANCE

A. Tree & Brush Removal
   1. Cut off trees, shrubs, brush, and vegetative growth 12 inches maximum above ground.
   2 .Do not pull up or rip out roots of trees and shrubs that are to remain. If excavation through roots is required, excavate by hand and cut roots with sharp axe. Make clean, smooth, sloping cuts.
   3. Cut roots 6 inches or larger in diameter only with Architect's written permission.

B. Grubbing
   1. Grub out stumps and roots 12 inches minimum below original ground surface, except as follows -
      a. Under buildings, remove roots one inch and larger entirely.
      b. ntirely remove roots of plants which normally sprout from roots, as identified by Architect.

C. Stripping
   1. Strip existing vegetation layer _____ inches deep minimum from areas of site to receive buildings, landscaping, and paving and remove from site prior to stripping topsoil for storage and reuse.
   2. After stripping vegetation layer, strip existing topsoil _____ additional inches deep minimum from areas of site to receive buildings and paving and store on site for later use.
      a. Existing topsoil is property of Contractor with the restriction that topsoil is to be used first for Project landscape topsoil requirements and second for fill and backfill.
      b. After Project fill, backfill, and landscape topsoil requirements are satisfied, remove excess existing topsoil from site. Do not remove existing topsoil from site without Architect's written approval.

3.3 CLEANING

A. Remove from site trees, shrubs, uprooted stumps, vegetative layer, and surface debris and dispose of legally.

B. Do not bury cuttings, stumps, roots, and other vegetative matter or burnt waste material on site.

END OF SECTION

SECTION 02211

ROUGH GRADING

PART 1 GENERAL

1.1 SUMMARY

A Includes But Not Limited To

1. Perform rough grading work required to prepare site for construction as described in Contract Documents.

B. Related Sections

1. Section 02001 - General Sitework Requirements

1.2 QUALITY ASSURANCE

A. Pre-Installation Meeting

1. See Section 01200.
2. Schedule meeting after completion of site clearing but prior to grading work. Identify benchmark to be used in establishing grades and review Contract Document requirements for grades, fill materials, and topsoil. Carefully examine site to pre-plan procedures for making cuts, placing fills, and other necessary work.

PART 2 PRODUCTS

2.1 MATERIALS

A. Materials used for fill shall be as specified for backfill in Section 02220.

PART 3 EXECUTION

3.1 PREPARATION

A. Before making cuts, remove topsoil over areas to be cut and filled that was not previously removed by stripping specified in Section 02110. Stockpile this additional topsoil with previously stripped topsoil.

3.2 ERFORMANCE

A. Site Tolerances

1. Maximum variation from indicated grades shall be 1/10 of one foot.
2. Make proper allowances for final finish grades of parking lot and planting areas.

B. hen existing grade around existing plants to remain is higher than new finish grade, perform regrading by hand. Do not expose or damage shrub or tree roots.

C. Compact fills as specified in Section 02220.

D. If soft spots, water, or other unusual conditions affecting grading requirements are encountered, stop work and notify Architect.

END OF SECTION

SECTION 02212

FINISH GRADING

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Perform finish grading work required to prepare site for installation of landscaping as described in Contract Documents including -
      a. Spread existing top soil stored on site over lawn and planting areas.
      b. Furnish and spread imported top soil over lawn and planting areas.

B. Related Sections
   1. Section 02110 - Stripping and storing of existing topsoil.
   2. ection 02921 - Soil amendments

1.2 SUBMITTALS

A. See Section 01300.

B. Quality Assurance
   1. Submit test on imported top soil by licensed laboratory prior to use, using criteria on Owner Form 3332. Imported top soil shall meet minimum specified requirements and be approved by Architect prior to use.
   2. Submit report stating location of source of imported topsoil and account of recent use.

1.3 QUALITY ASSURANCE

A. Pre-Installation Meeting
   1. See Section 01200.
   2. Participate in pre-installation meeting specified in Section 02211.

PART 2 PRODUCTS

2.1 MATERIALS

A. Imported Topsoil
   1. ertile, loose, friable soil meeting following criteria -
      a. Chemical Characteristics -
         1) Acidity/alkalinity range - pH 5.5 to 7.7
         2) Soluble Salts - less than 2.0 mmhos/cm
         3) Sodium Absorption Ratio (SAR) - less than 3.0
         4) Organic Matter - greater than 2 percent
         5) Nitrogen (NO^3N) - greater than 48 ppm
         6) Phosphorus (P) - greater than 11 ppm
         7) Potash (K) - greater than 130 ppm
         8) Iron (Fe) - greater than 5.0 ppm
      b. Physical Characteristics -
         1) Gradation as defined by USDA triangle of physical characteristics.
            Sand - 15 to 60 percent
            Silt - 10 to 70 percent
            Clay - 5 to 30 percent
         2) Clean and free from toxic minerals and chemicals, noxious weeds, weed seeds, rocks

larger than 1-1/2 inch in any dimension, and other objectionable materials.

3) Soil shall not contain more than 2 percent of particles measuring over 2.0 mm in largest size.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not commence work of this Section until grading tolerances specified in Section 02211 are met.

3.2 PREPARATION

A. Prior to grading, dig out weeds from planting areas by their roots and remove from site. Before placing top soil in landscape areas, remove rocks larger than 1-1/2 inches in size and foreign matter such as building rubble, wire, cans, sticks, concrete, etc.

3.3 PERFORMANCE

A. Site Tolerances
   1. Total Topsoil Depth -
      a. Lawn & Groundcover Planting Areas - 5 inches minimum
      b. Shrub Planting Areas - 12 inches minimum throughout entire shrub bed area.
   2. Elevation of Topsoil Relative to Walks or Curbs -
      a. Seeded Lawn Areas - 2 inches below
      b. Sodded Lawn Areas - 3 inches below

B. Do not expose or damage existing shrub or tree roots.

C. Redistribute approved existing top soil stored on site as a result of work of Section 02 110. Provide additional imported topsoil required to bring surface to specified elevation relative to walk or curb.

D. Slope grade away from building for 12 feet minimum from walls at slope of 1/2 inch per ft minimum unless otherwise noted. High point of finish grade at building foundation shall be 6 inches minimum below finish floor level. Direct surface drainage in manner indicated on Drawings by molding surface to facilitate natural run-off of water. Fill low spots and pockets with top soil and grade to drain properly.

END OF SECTION

SECTION 02220

EXCAVATING, BACKFILLING, & COMPACTING

PART 1 GENERAL

1.1 SUMMARY

A .Includes But Not Limited To

1. Perform Project excavating, trenching, backfilling, and compacting as described in Contract Documents, except as specified below.
2. rocedure and quality for excavating, trenching, backfilling, and compacting performed on Project under other Sections unless specifically specified otherwise.

B. Related Sections

1. Section 02001 - General Sitework Requirements
2. Section 02110 - Site Clearing
3. Section 02500 - Compaction of sub-grade under walks and paving.
4. Section 02700 - Sewerage & Drainage
5. Performance of excavating, backfilling, and compacting inside and outside of building required for electrical and mechanical work is responsibility of respective Section doing work unless arranged differently by Contractor.

1.2 REFERENCES

A. American Society For Testing And Materials

1. ASTM D 1557-91, "Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort"
2. STM D 2216-90, "Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock"
3. ASTM D 2487-93, "Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)"
4. ASTM D 2922-91, "Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)"
5. ASTM D 3017-88, "Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)"

1.3 DEFINITIONS

A. Relative Compaction - Ratio of field dry density as determined by ASTM D 2922 and ASTM D 3017 or 2216, and laboratory maximum dry density as determined by ASTM D 1557.

1.4 QUALITY ASSURANCE

A. Pre-Installation Meeting

1. See Section 01200.
2. Participate in pre-installation meeting specified in Section 02211.

1.5 PROJECT/SITE CONDITIONS

A. If existing utility lines not described in Contract Documents are encountered, contact Architect before proceeding.

1.6 SEQUENCING

A. Before backfilling, show utility and service lines being covered on record set of Drawings. Do not backfill until utilities involved have been tested and approved by Architect and until instructed by Architect.

PART 2 PRODUCTS

2.1 ATERIALS

A. Standard Backfill
   1. Well graded material free from debris, organic material, frozen materials, brick, lime, concrete, and other material which would prevent adequate performance of backfill.
   2. Fill shall conform to ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, or SM.
      a. Fill more than 24 inches below finish grade may not contain stones over 6 inches diameter and 90 percent minimum of fill shall be smaller than 1-1/2 inch in any direction.
      b. Fill less than 24 inches below finish grade may contain no stones larger than 1-1/2 inches in any direction.

B. Excavatable Slurry Backfill
   1. Contain maximum of 94 lbs of cement per yard of backfill.
   2. Minimum stable air content of 20 percent, Darafill dosage as necessary
   3. Maximum water content of 36 gallons per yard of backfill.
   4. Maximum compressive strength of 150 psi at 28 days.
   5. Approved Manufacturers -
      a. Darafill by W R Grace & Co, Cambridge MA (800) 521-2737
      b. Equal as approved by Architect before bidding. See Section 01600.

PART 3 EXECUTION

3.1 EXAMINATION

A. Carefully examine site and available information to determine type soil to be encountered. Discuss problems with Architect before proceeding with work.

3.2 PERFORMANCE

A. Excavating
   1. Building Footings & Foundations -
      a Excavate as necessary for proper placement and forming of footings and foundations.
      b. ottom of excavations to receive footings shall be undisturbed soil.
      c. Excavation Carried Deeper Than Required -
         1) Under Footings - Fill with concrete specified for footings.
         2) Under Slabs - Use specified compacted backfill material.
   2. Pavement & Concrete Site Elements -
      a. Excavate as necessary for proper placement and forming of concrete site elements and pavement structure. Remove vegetation and deleterious material and remove from site.
      b. Backfill over-excavated areas with compacted base material specified in Section 02500.
      c. Remove and replace exposed material which becomes soft or unstable.
   3. Site Utility Trenches -
      a. Excavate to proper alignment, depth, and grade. Excavate to sufficient width to allow adequate space for proper installation and inspection of site utility.
      b. Backfill over-excavated areas with compacted native material.
   4. If unusual excavating conditions are encountered, stop work and notify Architect.

B. Backfilling
   1. Around Buildings & Structures - Slope grade away from building as specified in Section 02212. Hand backfill when close to building or where damage to building might result.

2. Site Utilities -
    a. Landscape Areas - Cover utilities with 3 inches minimum of sand slurry backfill. Place remaining backfill consisting of on-site soil in 12 inch maximum layers compacted as specified. Do not place remaining backfill until sand slurry has cured 72 hours.
    b. Pavement & Concrete Site Elements - Extend sand slurry backfill to elevation of subgrade. Do not place base material until sand slurry has cured 72 hours.

C. Compacting
1. General -
    a. Do not use puddling or jetting to consolidate fill areas.
    b. If site material will not compact to specified density or it is suspected that it will not, remove and replace with material specified in PRODUCT section above.
2. Sub-Grade -
    a. Under Building Slabs/Pads, Concrete Site Elements, & Portland Cement Concrete Driveways & Parking Areas - Moisture condition soil to uniform moisture content between optimum and 4 percent over optimum, and mechanically tamp 6 inches deep to 90 percent minimum of relative compaction.
    b. Under Asphalt Concrete Driveways & Parking Areas - Moisture condition soil to uniform moisture content between optimum and 4 percent over optimum, and mechanically tamp 6 inches deep to 95 percent minimum of relative compaction.
    c. Landscape Areas - Compact to 85 percent relative compaction to within 12 inches of finished grade elevation.
3. Fill, Backfill, & Base -
    a. Under Building Slabs/Pads, Driveways, & Parking Areas - Place in 8 inch maximum layers, dampen (do not soak), and mechanically tamp to 95 percent minimum of maximum density as established by ASTM D 1557.
    b. Under Concrete Site Elements & Around Foundation Walls - Place in 8 inch maximum layers, dampen (do not soak), and mechanically tamp to 90 percent minimum of maximum density as established by ASTM D 1557.
    c. Site Utility Trenches -
        1) Consolidate sand slurry backfill using vibrating or other means.
        2) Moisture condition standard backfill to be placed above sand slurry backfill to plus or minus 2 percent of optimum moisture and compact to 90 percent minimum relative compaction to within 12 inches of finish grade.
    d. Fill Slopes - Compact by rolling or using sheepsfoot roller.
    e. Backfill Under Footings - Not allowed.
    f. Other Backfills - Place other fills in 12 inch layers and compact to 90 percent relative compaction.

3.3 REPAIR/RESTORATION

A. Damage to other portions of the Work due to work of this Section shall be repaired at no additional cost to Owner. On new work, damage shall be repaired by original installer.

3.4 CLEANING

A. Debris and material not necessary for Project are property of Contractor and are to be removed prior to completion of Project. However, if material necessary for Project is hauled away, replace with specified backfill material.

END OF SECTION

SECTION 02233

GRANULAR BASE

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install granular base under interior slabs-on-grade as described in Contract Documents.

B. Products Installed But Not Supplied Under This Section
   1. Under-slab laminated vapor retarder and seam tape.

C. Related Sections
   1. Section 02001 - General Sitework Requirements
   2. Section 02510 - Base course under asphalt concrete paving
   3. Section 02520 - Base course under Portland cement concrete paving
   4. Section 02521 - Granular base under concrete site elements
   5. Division 07 - Furnishing of laminated vapor retarder & seam tape

1.2 SEQUENCING

A. Install laminated vapor retarder and granular base system immediately after application of termite control and prior to placing concrete.

PART 2 PRODUCTS

2.1 GRANULAR BASE

A. Gravel - 1/4 inch minimum to one inch maximum well-graded, clean gravel or crushed rock.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install laminated vapor retarder over compacted subbase and tops of interior stem walls so entire area under slab is covered.
   1. Lap joints 3 inches minimum and seal with specified seam tape.
   2. Seal vapor retarder around pipes, conduits, and other utility items which penetrate vapor retarder using factory-fabricated boot installed as recommended by Manufacturer.
   3. Except for punctures required for reinforcing and anchor bolts at top of stem walls, seal tears and punctures prior to placing granular base.

B. Place 4 inches minimum of granular base over laminated vapor retarder, level, and compact as specified in Section 02220.

C. Do not allow water onto vapor retarder or granular base prior to placing of concrete.

3.2 FIELD QUALITY CONTROL

A. Notify Architect 2 days prior to installation of concrete to allow inspection of laminated vapor retarder and granular base installation.

END OF SECTION

SECTION 02282

TERMITE CONTROL

PART 1 GENERAL

1.1SUMMARY

A. Includes But Not Limited To
   1. Furnish and install complete "preconstruction" soils treatment under and adjacent to building to provide uniform toxic barrier in all routes of termite entry.
   2. Furnish and install complete "postconstruction" soils treatment under and adjacent to building to provide uniform toxic barrier in all routes of termite entry.

B. Related Sections
   1. Section 02233 - Installation of laminated vapor retarder.

1.2 SUBMITTALS

A. See Section 01300.

B. Product Data - Submit Chemical Manufacturer's printed literature regarding chemical composition, concentration, and rates and method of application.

C. Quality Control
   1. Submit statement indicating total amount of chemical required for Project to provide required amount of mix solution at specified concentration and application rates.
   2. Submit statement indicating total amount of mix solution required for Project. Statement shall also include amounts of square foot and lineal foot application per specified application rate.
   3. Provide one sample of approximately one cup from each batch of mix solution. Label each sample with Project name, date of application, chemical composition, and mix concentration. Draw off each sample in Architect's presence.

1.3 QUALITY ASSURANCE

A. Qualifications - Use of specified chemicals is restricted to certified applicators, or persons under their direct supervision, and only for those uses covered by certified applicator's certification.

B. Regulatory Requirements
   1. This specification covers more than one chemical and, therefore, is not specific in all aspects of handling and usage.
   2. Requirements for application by "certified applicators" presumes that Manufacturer's requirements and those of federal, state, and local regulatory agencies shall be met.
   3. Nothing in Contract Documents shall be construed as allowing circumvention of above requirements.

1.4 DELIVERY, STORAGE, & HANDLING

A. Store in secure location out of reach of unauthorized personnel.

B. Keep containers closed when not in use. Do not store near food or feed. Protect from freezing. In case of spill or leak on floor or paved surfaces, soak up with sand, earth, or synthetic absorbent. Remove residue to chemical waste area.

C. Dispose of empty containers in accordance with Manufacturer's and regulatory agency's requirements.

1.5 SCHEDULING

A. Coordinate work so laminated vapor retarder can be installed immediately after application of termite protection.

1.6 WARRANTIES

A. Furnish written warranty which includes
   1. Chemical concentration and application rates comply with Contract Documents, Chemical Manufacturer's recommendations, and applicable governmental regulations. Warranty shall state concentrations and rates of application used.
   2. Effectiveness of treatment against subterranean termite infestation is guaranteed for five years minimum from acceptance date of Project.

PART 2 PRODUCTS

2.1 MATERIALS

A. Approved Products
   1. Chlorpyrifos (Trade Name - Dursban TC)
   2. Permethrin (Trade Names - Dragnet, Torpedo).

2.2 MIXES

A. Unless recommended differently by Manufacturer, mix solution by using two gallons of chemical (0.5 percent Active Ingredients) to 98 gallons of water.

PART 3 EXECUTION

3.1 PREPARATION

A. Do not apply emulsion until location of air ducts, vents, water, and sewer lines are known and identified. Take extreme caution to avoid contamination of these structural elements and airways.

B. Protection
   1. Allow no disturbance of treated soil between application of poison and placing of concrete. Reapply soil treatment solution to areas disturbed by subsequent excavation, other construction activities, or heavy rain following application.
   2. Protect neighboring property, water sources, and personnel on site from contamination.
      a. Use anti-backflow equipment or procedures.
      b. Do not treat soil beneath structures that contain wells or cisterns.
      c. Take extreme care to avoid runoff. Do not treat soil that is water-saturated or frozen.
   3. Maintain, on job site, empirical name of chemical, Manufacturer's precautions, and phone numbers of proper authorities to notify in case of spillage or other accident.

3.2 APPLICATION

A. Apply one of specified chemicals as water emulsion at concentrations and volume specified. If impervious soils make reduction in volume of solution necessary, increase percentage of toxicant used in proportion to insure same amount of insecticide be used per linear or square foot.

B. Preconstruction Treatment
1. Provide unbroken vertical and horizontal chemical barrier to termite entry.
2. For Slab-on-Grade Construction -
      a. One gal per 10 sq ft as overall treatment under slab and attached porches.
      b. 4 gals per 10 lin ft along inside and outside of exterior foundation walls, both sides of

interior partition foundation walls, and around utility services and other features that will penetrate slab.

c. 2 gals per 10 lin ft in voids of unit masonry foundation walls or piers.

C Postconstruction Treatment

1. Use sub-slab injection, rodding, or trenching with low-pressure spray. Do not make an overall broadcast application of chemical in crawl space or on any soil beneath plenum air space. Do not extend below tops of footings.

2. For Slab-on-Grade Construction -

a. One gal per 10 sq ft as overall treatment under slab and attached porches.

b. 4 gals per 10 lin ft along inside and outside of exterior foundation walls, both sides of interior partition foundation walls, and around utility services and other features that will penetrate slab.

c. 2 gals per 10 lin ft in voids of unit masonry foundation walls or piers.

3.3 FIELD QUALITY CONTROL

A. Inspection

1. Notify Architect two working days prior to application of chemicals.

2. Deliver chemicals to site in Manufacturer's original, unopened containers and mix to specified concentration in Architect's presence.

B. Site Tests

1. Have applicable governmental agency test application for amount of chemical applied. Submit test results to Architect.

2. Samples provided under Article 1.2, C, 3 above will be submitted to laboratory analysis by Architect if requested by Owner in accordance with General Conditions Section 7.

3.4 PROTECTION

A. Allow 12 hours for drying after application before resuming construction activities. Post signs in areas of application warning of poison application. Remove signs when areas with application are covered by other construction.

END OF SECTION

SECTION 02283

VEGETATION CONTROL

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Quality of soil sterilant used under paving and site concrete and usage instructions.

B. Related Sections
   1. Section 02500 - Furnishing and installing under paving and site concrete.

1.2 SUBMITTALS

A. See Section 01300.

B. Product Data - Manufacturer's published product data.

C. Quality Assurance - Manufacturer's application instructions.

PART 2 PRODUCTS

2.1 MATERIALS

A. Approved Products & Manufacturers
   1. Treflan EC by DowElanco Products Co, Indianapolis, IN (800) 258-3033
   2. Equal as accepted by local code authority and approved by Architect before bidding. See Section 01600.

PART 3 EXECUTION

3.1 PREPARATION

A. Take necessary precautions to protect adjoining property and areas designated for planting on building site.

3.2 APPLICATION

A. Apply in accordance with Manufacturer's directions at 4 gal/acre.

END OF SECTION

SECTION 02510

ASPHALTIC CONCRETE PAVING

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Prepare pavement sub-grade as described in Contract Documents to receive pavement base and paving.
   2. Furnish and install pavement base in driveways and parking areas as described in Contract Documents.
   3. Furnish and install asphaltic concrete for driveways and parking areas as described in Contract Documents.

B. Related Sections
   1. Section 02001 - General Sitework Requirements
   2. Section 02220 - Compaction procedures and tolerances
   3. Section 02283 - Quality of soil sterilant

1.2REFERENCES

A. American Society For Testing And Materials
   1. ASTM C 131-89, "Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine"
   2. ASTM D 977-86, "Specifications for Emulsified Asphalt"
   3. ASTM D 1075-88, "Test Method for the Effect of Water on Cohesion of Compacted Bituminous Mixtures."
   4. ASTM D 1557-91, "Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort"
   5. ASTM D 1559-89, "Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus".
   6. ASTM D 2027-76 (1986), "Specification for Cutback Asphalt (Medium Curing Type)"
   7. ASTM D 2397-85, "Specification for Cationic-Emulsified Asphalt"
   8. ASTM D 3381-83, "Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction"

1.3 SUBMITTALS

A. See Section 01300.

B. Quality Control
   1. Mix design of asphalt concrete mixture.
   2. Copies of test results from tests conducted to assure compliance to Contract Document requirements.

1.4 QUALITY ASSURANCE

A. Pre-Installation Meetings
   1. See Section 01200.
   2. Participate in pre-installation meeting specified in Section 02211.
   3. Schedule paving pre-installation meeting after staking of parking areas and installation of sleeves, but prior to installation of base and paving.

1.5 PROJECT/SITE CONDITIONS

A. Environmental Requirements
1. Do not perform work during unfavorable conditions as specified below -
a. Temperature below 50 deg F.
b Presence of free surface water.
c. Over-saturated base and sub-grade materials.

PART 2 PRODUCTS

2.1 MATERIAL

A. Sub-Grade - As specified in Section 02220.

B. Base
1. New Aggregate Base - Road Base type gravel or crushed stone, graded as follows -

Sieve	Percent by Weight Passing Sieve
1"	100
3/4"	85 - 100
#4	45 - 60
#10	30 - 50
#200	5 - 10 (non-plastic)

2. Recycled Aggregate Base -
a. Pulverized existing Portland cement or asphalt cement concrete paving mixed uniformly with existing aggregate base.
b. Conform to following gradation -

Sieve	Percent by Weight Passing Sieve
2"	100
1-1/2"	85 - 100
3/4"	60 - 80
#4	30 - 50
#200	5 - 12

c. Quality Requirements as established by testing -
1) R-value - 70 minimum
2) Sand Equivalent - 25 minimum
3) Durability Index - 35 minimum

C. Asphalt Cement Primer - Meet requirements of ASTM D 2027, MC 70, plus or minus one grade.

D. Tack Coat - Emulsified asphalt meeting requirements of either ASTM D 977, Grade SS-1H, or ASTM D 2397, Grade CSS-1H.

E. Pavement
1. Asphalt Cement -
A .Meet requirements of ASTM D 3381, Viscosity grade (Original Asphalt) as follows -
1) AC5 in cold climatic conditions
2) AC10 in moderate climatic conditions
3) AC20 in hot climatic conditions
2. Aggregates -
a. Fine to coarse mineral aggregates with wear less than 40 percent as determined by ASTM C 131 and mineral filler suitable for pavement meeting following gradation requirements -

Sieve	Percent by Weight Passing Sieve
3/4"	100
1/2"	95 - 100
3/8"	80 - 95
#4	54 - 71
#8	38 - 54
#30	17 - 32
#200	3 - 8 (non-plastic)

b. Up to 15 percent by weight of total aggregates may consist of pulverized, recycled

asphalt cement concrete pavement, providing aggregate grading requirements are met.

2.2 MIXES

A. Central plant hot mix.

B. Develop mix design according to Marshall Method to achieve optimum asphalt content as shown by test data curves based on testing samples containing 1/2 percent increments of asphalt content. Samples shall include minimum of two with asphalt content above optimum and two with asphalt content below optimum.

1. Make tests in accordance with ASTM D 1559 and ASTM D 1075-88. (50 blow count Marshall)
2. Final design shall meet following criteria -
   a. Stability - 1200 pounds min
   b. Flow - 8 min, 18 max
   c. Air voids - 3 percent min, 5 percent max
   d. Voids in mineral aggregate - 15 percent min
   e. Asphalt cement by weight of total - 5 percent min
   f. Dry Strength - 200 psi
   g. Index of Retained Strength - 75 percent

PART 3 EXECUTION

3.1 PREPARATION

A. Survey and stake parking surfaces to show grading required by Contract Documents.

3.2 APPLICATION

A. Site Tolerances
1. Sub-Grade - 0.00 inches high. Measure using stringline from curb to curb, gutter, flat drainage structure, or grade break.
2. Base -
   a. Base shall be 6 inches thick minimu after compaction, except where shown thicker on Drawings.
   B .Measure using stringline from curb to curb, gutter, flat drainage structure, or grade break.
3. Paving -
   A .Asphaltic concrete paving shall be 3 inches minimum after compaction, except where shown thicker on Drawings.
   b. Paving adjacent to cast-in-place concrete site elements shall be between 1/4 inch higher than concrete and flush with concrete.
   c. Surface texture of hand work areas shall match texture of machine-laid areas.

B. Sub-Grade
1. Fine grade parking surface area to grades required by Contract Documents.
2. Compact as specified in Section 02220.

C. Base
1. If roller is smaller than 8 ton, lay gravel and compact in two courses.
2. Compact as specified in Section 02220.
3. Remove or repair improperly prepared areas as directed by Architect.

D. Asphaltic Concrete Paving
1. Apply specified soil sterilant immediately before application of paving.
2. Prime base with application of 0.2 to 0.5 gallons of asphalt cement primer per square yard.
3. Uniformly mix materials so aggregate is thoroughly coated with asphalt.
4. Place at temperatures between 250 and 325 deg F with a self-propelled laydown machine.
5. Longitudinal bituminous joints shall be vertical and properly tack coated if cold. Transverse joints shall always be tack coated.

6. Compaction -
    a. Compact asphaltic concrete paving to 96 percent minimum of design density as determined by ASTM D 1559.
    b. Roll with powered equipment capable of obtaining specified density.
    c. Begin breakdown rolling immediately after asphalt is placed when asphalt temperature is at maximum. Complete breakdown rolling before mix temperature drops below 240 deg F. Complete handwork compaction concurrently with breakdown rolling.
    d. Complete intermediate rolling as soon as possible after breakdown rolling and before mix temperature drops below 185 deg F. Do not roll paving for compaction purposes after asphalt temperature falls below 185 deg F.
    e. Execute compaction so visibility of joints is minimized. Complete finish rolling to improve asphalt surface as soon as possible after intermediate rolling and while asphalt paving is still warm. Do not use vibration for finish rolling.
7. Surface shall be uniform with no 'birdbaths'. Leave finished surfaces clean and smooth. Variations from specified grades shall not exceed 1/2 inch.

3.3 FIELD QUALITY CONTROL

A. Site Tests - When tested with 10 foot straight edge, surface of complete work shall not contain irregularities in excess of 1/4 inch.

END OF SECTION

SECTION 02520

PORTLAND CEMENT CONCRETE PAVING

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Prepare pavement sub-base as described in Contract Documents to receive pavement base and paving.
   2. Furnish and install pavement base as described in Contract Documents.
   3. Furnish and install Portland cement concrete paving as described in Contract Documents.

B. Related Sections
   1. Section 02001 - General Sitework Requirements
   2. Section 02220 - Compaction procedures and tolerances
   3. Section 02283 - Quality of soil sterilant
   4. Division 03 - Curing compounds
   5. Division 07 - Quality of joint sealants including other contractual and installation requirements

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM D 1557-91, "Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort"

1.3 SUBMITTALS

A. See Section 01300.

B. Shop Drawings - Submit joint layout plan for written approval prior to starting work on this Section.

1.4 QUALITY ASSURANCE

A. Pre-Installation Meetings
   1. See Section 01200.
   2. Participate in pre-installation meeting specified in Section 02211.
   3. Schedule paving pre-installation meeting after surveying and staking of parking areas and installation of sleeves, but prior to installation of base and paving.

1.5 SITE CONDITIONS

A. Do not execute work during unfavorable conditions as specified below -
   1. Temperature below 50 deg F.
   2. Presence of free surface water.
   3. Over-saturated base and sub-base materials.

PART 2 PRODUCTS

2.1 MATERIALS

A. Sub-base - As specified in Section 02220.

B. Base - Road base type gravel or crushed rock, graded as follows -

Sieve	% by Weight Passing Sieve
1"	100
3/4"	85 - 100
#4	45 - 60
#10	30 - 50
#200	5 - 10 (non-plastic)

C. Concrete

1. Conform to applicable requirements specified in Section 03313 for exterior concrete with following modifications and additions -
   a. Air Entrainment - 6-1/2%, plus or minus 1%
   b. Water-Cement Ratio - 0.49 maximum by weight
   c. Curing - Curing compounds may be used instead of moist curing.

PART 3 EXECUTION

3.1 PREPARATION

A. Survey and stake parking surfaces to show grading required by Contract Documents.

3.2 INSTALLATION

A. Site Tolerances - Finished base course shall be true to line and grade within plus or minus 1/4 inch in 10 feet.

B. Sub-Base - Fine grade parking surface area to grades required by Contract Documents. Compact as specified in Section 02220.

C. Base

1. 4 inches thick minimum after compaction.
2. Compact to 95% minimum density as determined by ASTM D 1557.
3. Remove or repair improperly prepared areas as directed by Architect.

D. Paving Placement

1. Apply soil sterilant immediately prior to placing concrete.
2. Place, strike off, and consolidate concrete with mechanical finishing machine or vibrating screed.
   a. Hand finishing methods may be used if approved by Architect.
   b. If screed is used, carry 2 inches of concrete minimum in front of screed for full width of pavement.
   c. Concrete may also be placed with slipform paver designed to spread, consolidate, screed, and float-finish concrete in one pass.
2. Finish - Skid-resistant finish made with burlap drag or broom.
3. Curing - See Sections 03 313 and 03 371.
4. Joints -
   a. Control -
      1) Depth shall be 1/4 slab thickness.
      2) Complete before shrinkage cracking occurs.
      3) Make continuous across slab unless interrupted by expansion or isolation joint. Extend through adjoining curbs, gutters, and sidewalks.
      4) Space not more than 12'6" apart in any direction.
      5) Control Jointing Methods -
         a) Sawing - Begin sawing joints as soon as concrete has hardened enough to permit sawing without ravelling.
         b) Hand-Formed - Maximum edge radius shall be 1/4 inch.
         c) Pre-molded joint former
      6) Do not seal control joints unless detailed on Drawings.

b. Expansion or Isolation -
   1) Use to isolate fixed objects abutting or within paved area. Joints shall contain pre-molded joint filler for full depth of slab.
   2) Space not more than 65 feet apart in any direction.
   3) Clean and seal before opening parking area to traffic.

3.4 PROTECTION

A. Do not open pavement to traffic for three days or until concrete reaches a compressive strength of at least 1800 psi, whichever is longer. Restrict traffic to passenger cars and light trucks for seven days. In all cases, obtain approval from Architect before allowing access to parking area by traffic.

END OF SECTION

SECTION 02521

CAST-IN-PLACE CONCRETE SITE ELEMENTS

PART 1 GENERAL

1.1 SUMMARY

A .Includes But Not Limited To
1. Compact sub-base as described in Contract Documents.
2. Furnish and install granular base and soil sterilant as described in Contract Documents.
3. Furnish and install following cast-in-place concrete site elements as described in Contract Documents -
   a. Curb, gutter, sidewalks
   b. Light pole bases

B. Products Installed But Not Supplied Under This Section
1. Lightpole base anchors

C. Related Sections
1. Section 02001 - General Sitework Requirements
2. Section 02220 - Compaction procedures and tolerances
3. Section 02283 - Quality of soil sterilant
4. Section 02811 - Sleeves for underground irrigation system
5. Division 16 - Furnishing of lightpole base anchors

1.2 REFERENCES

A. American Society For Testing And Materials
1. ASTM D 1751-83, "Specification for Preformed Expansion Joint Fillers for Concrete Paving & Structural Construction (Non-extruding & Resilient Bituminous Types)"

1.3 QUALITY ASSURANCE

A. Pre-Installation Meetings
1. See Section 01200.
2. Participate in pre-installation meeting specified in Section 02211.
3. Schedule concrete site element pre-installation meeting after installation of sleeves, placing of base, and installation of forms, but before placing of concrete.

B. Meet quality assurance/control requirements specified in Section 03300.

PART 2 PRODUCTS

2.1 MATERIALS

A. Formwork - Meet requirements specified in Section 03110.

B. Granular Base - Road Base type gravel or crushed rock, graded as follows -

Sieve	Percent by Weight Passing Sieve
1"	100
3/4"	85 - 100
#4	45 - 60
#10	30 - 50
#200	5 - 10 (non-plastic)

C. Expansion Joints
1. Manufactured commercial fiber type meeting requirements of ASTM D 1751 and 1/2 inch thick.

2. Approved Manufacturers -
   a. "Sealtight" by W R Meadows Inc, Elgin, IL (708) 683-4500
   b. Equal as approved by Architect before bid. See Section 01600.

D. Concrete - Meet requirements specified in Section 03313 for exterior concrete.

PART 3 EXECUTION

3.1 INSTALLATION

A. Sub-Base - Compact sub-base as specified in Section 02220.

B. Granular Base - Except under mow strips, place 4 inches minimum of granular base, level, and compact as specified in Section 02220.

C. Soil Sterilant - Apply on granular base between concrete forms immediately before placing concrete.

D .Joints
1. Align joints of sidewalk and curb & gutter.
2. Expansion & Contraction Joints -
   a. Spacing -
      1) Sidewalks & Curbs - 50 feet on center.
   b. Install so top of expansion joint material is 1/4 inch below finished surface of concrete.
   c. No expansion joint required between curbs and walks parallel to curb.
   d. Provide expansion joint at end of walks perpendicular to and terminating at curb.
3. Scored Control Joints -
   a. Spacing -
      1) Curbs - 10 feet on center.
      2) Sidewalks - 5 feet on center.
   b. Control joints shall be approximately one quarter of concrete thickness.

E. Finish
1. Curb, Gutter, Sidewalks, Flat Drainage Structures, & Stairs -
   a. Standard Finishing -
      1) Broom finish.
      2) Round edges including edges formed by expansion joints.
      3) Remove edger marks.
   b. Handicap Tactile Surfacing -
2. Light Pole - Exposed portion to have rubbed finish.

F. Special Requirements
1. Sidewalks -
   a. Slope to drain.
      1) Slope sidewalks with transverse slope of 1/4 inch per ft in direction of intended drainage.
      2) Slope sidewalks away from building 3 percent minimum.
   b. Dusting with cement not permitted.
2. Light Pole Bases - Install bond breaker consisting of three layers of 30 lb roofing felt between pole base and adjoining sidewalk.

3.2 FIELD QUALITY CONTROL

A. Inspection - To allow Architect's verification of grades and elevations, notify Architect three days minimum prior to placing concrete for specified concrete site elements.

END OF SECTION

SECTION 02 527

PRECAST CONCRETE PARKING BUMPERS

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install precast concrete parking bumpers as described in Contract Documents.

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM A 615-90, "Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement"
   2. ASTM C 33-90, "Specification for Concrete Aggregates"
   3. ASTM C 150-89, "Specification for Portland Cement"

PART 2 PRODUCTS

2.1 MANUFACTURED UNITS

A. Parking Bumpers
   1. Precast concrete 3000 psi with cast openings for pins and chamfered edges. Free from pits and rock pockets.
      a. Cement - ASTM C 150, Type II
      b. Aggregates - ASTM C 33
      c. Reinforcing Steel - ASTM A 615, Grade 60. Two bars #3 minimum, full length of bumper.
      d. Calking Compound - As specified in Section 07 920 for sidewalks.

B. Pins - Galvanized steel pipe 3/4 inch diameter, 24 inches long.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install level with paving and aligned with sidewalks.

B. Recess anchoring pins 1/2 inch below top of bumper. Calk hole to top of bumper.

END OF SECTION

SECTION 02668

POTABLE WATER SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Perform trenching and backfilling required for work of this Section.
   2. Furnish and install piping from water main to within 5 feet of building as described in Contract Documents complete with meter, shut-off valve, and connections.

B. Related Sections
   1. Section 02001 - General Sitework Requirements
   2. Section 02220 - Procedure and quality of excavating, backfilling, & compacting

1.2 REFERENCES

A. American National Standards Institute/American Welding Society
   1.ANSI/AWS A5.8-92, "Standard Specification for Brazing Alloys"

B. American Society For Testing and Materials
   1.ASTM B 88-93, "Standard Specification for Seamless Copper Water Pipe"

PART 2 PRODUCTS

2.1 MATERIALS

A. Pipe - Type K copper meeting requirements of ASTM B 88 with wrought copper, brazed fittings.

B. Water Meter - As required by local agency furnishing water.

C. Connection Material
   1. Brazing Rods In accordance with ANSI/AWS A5.8 -
      a. Classification BCuP-4 Copper Phosphorus (6 percent silver).
      b. Classification BCuP-5 Copper Phosphorus (15 percent silver).
      c. Classification BAg-5 Silver (45 percent silver).
      d. Do not use rods containing Cadmium.
   2. Flux -
      a. Approved Products & Manufacturers -
         1) "Stay-Silv white brazing flux" by J W Harris Co
         2) High quality silver solder flux by Handy & Harmon

PART 3 EXECUTION

3.1 INSTALLATION

A. Excavate and backfill as specified in Section 02220 with following additional requirements -
   1. Runs shall be as close as possible to those shown on Drawings.
   2. Excavate to required depth.
   3. Grade to obtain fall required.
   4. Bottom of trenches shall be hard. Tamp as required.
   5. Remove debris from trench prior to laying of pipe.
   6. Do not cut trenches near footings without consulting Architect.

7. Excavate trenches so outside pipe will be 12 inches minimum below frost line or 24 inches minimum below finish grade, whichever is deeper.

8. Backfill only after pipe lines have been tested, inspected, and approved by Architect.

B. Install piping system so it may contract and expand freely. Completely eliminate cross connections, backflow, and water hammer.

C. Install shut-off valve at meter.

3.2 FIELD QUALITY CONTROL

A. Site Tests

1. Sterilization & Negative Bacteriological Test -
   a. Sterilize potable water system with solution containing 200 parts per million minimum of available chlorine and maintaining a pH of 7.5 minimum. Introduce chlorinating materials into system in manner approved by Architect. Allow sterilization solution to remain for 24 hours and open and close valves and faucets several times during that time.
   b. After sterilization, flush solution from system with clean water until residual chlorine content is less than 0.2 parts per million.
   c. Water system will not be accepted until negative bacteriological test is made on water taken from system. Repeat dosing as necessary until such negative test is accomplished.
2. Pressure Test - Before covering pipes, test system in presence of Architect or governing agency at 100 psi hydrostatic pressure for two hours and show no leaks.

3.3 CLEANING

A. Remove excess earth from site or place as directed by Architect.

END OF SECTION

SECTION 02730

SANITARY SEWAGE SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Perform excavating and backfilling required for work of this Section.
   2. Furnish and install sanitary sewage system as described in Contract Documents beginning at 5 feet from where it enters building and connecting to serving sewer system.
   3. Pay necessary fees to governing agency of sewer system.

B. Related Sections
   1. Section 02001 - General Sitework Requirements
   2. Section 02220 - Procedure and quality of excavating, backfilling, & compacting
   3. Division 15 - Sanitary sewage system within building and within 5 feet of building.

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM A 74-92, "Specifications for Cast Iron Soil Pipe & Fittings"
   2. ASTM C 564-88, "Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings"
   3. ASTM D 2321-89, "Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe"
   4. ASTM D 3034-89, "Specification for Type PSM Poly (Vinyl Chloride)(PVC) Sewer Pipe & Fittings"
   5. ASTM F 789-89, "Standard Specification for Type PS-46 Poly (Vinyl Chloride)(PVC) Plastic Gravity Flow Sewer Pipe and Fittings"

1.3 QUALITY ASSURANCE

A. Regulatory Requirements - Install cleanouts in accordance with local governing authority and State codes.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Cast Iron Soil Pipe & Fittings
   1. Meet requirements of ASTM A 74, Service Grade.
      a. Cast iron for bell & spigot fittings
      b. Cast iron for "no-hub" joints.
   2. Joint Material -
      a. For Bell & Spigot Pipe -
         1)50% oakum and 50% lead, well calked.
         2)Rubber gaskets meeting requirements of ASTM C 564 and compatible with pipe used.
      b. For "No-Hub" Pipe -
         1) Neoprene gaskets with type 304 stainless steel clamp and 24 ga type 304 stainless steel housing by Clamp-All Corp, Ward Hill, MA.
         2) "Best" couplings & gaskets by American Brass & Iron Foundry, San Leandro, CA
         3) Husky SD 4000 coupling by ANACO, Anaheim, CA
         4) MG Coupling by MG Piping Products Co

B. PVC Pipe & Fittings
   1. Gasket-joint gravity sewer pipe and fittings meeting requirements of ASTM D 3034 SDR-35 or ASTM F 789.

2. Joints shall be integral wall bell and elastomeric gasket.
3. Approved Manufacturer -
    a. Carlon PS-46 PRIME by Carlon (an Indian Head company), 25701 Science Park Drive, Cleveland, OH 44122 (216) 831-4000. With service centers at -
        1) Oklahoma City, OK (405) 672-4531
        2) High Springs, FL (904) 454-1697
        3) Woodland, CA (916) 666-1681
        4) Nazareth, PA (215) 759-6760
        5) Compton, CA (213) 631-6171

PART 3 EXECUTION

3.1 INSTALLATION

A. Excavate and backfill as specified in Section 02220 with following additional requirements
1. Runs shall be as close as possible to those shown on Drawings.
2. Excavate to required depth and grade to obtain fall required.
3. Bottom of trenches shall be hard. Tamp as required.
4. Remove debris from trench prior to laying of pipe.
5. Do not cut trenches near footings without consulting Architect.

B. Cast Iron Pipe & Fittings
1. Install materials in accordance with Manufacturer's instructions.
2. Provide depression under bell of each joint to maintain even bearing of sewer pipe.
3. Connect to street main as required by local authorities.
4 Use jacks to make-up gasketed joints.

C. PVC Pipe & Fittings
1. Install in accordance with Manufacturer's recommendations and ASTM D 2321.
2 Stabilize unstable trench bottoms.
3. Bed pipe true to line and grade with continuous support from a firm base.
    a. Bedding depth - 4 to 6 inches.
    b. Material and compaction to meet ASTM standard noted above.
4. Excavate bell holes into bedding material so pipe is uniformly supported along its entire length. Blocking to grade pipe is forbidden.
5. Trench width at top of pipe -
    a. Minimum - 18 inches or diameter of pipe plus one foot, whichever is greater.
    B Maximum - Outside diameter of pipe plus two feet.
6. Piping and joints shall be clean and installed according to Manufacturer's recommendations.
    a. Break down contaminated joints, clean seats and gaskets and reinstall.
7. Do not use a back hoe or power equipment to assemble pipe.
8. Initial backfill shall be 12 inches above top of pipe with material specified in referenced ASTM standard.
9. Minimum cover over top of pipe -
    a. 36 inches before wheel loading.
    b. 48 inches before compaction.

3.2 FIELD QUALITY CONTROL

A. Failure to install joints properly shall be cause for rejection and replacement of piping system.

3.3 CLEANING

A. Remove excess earth from site or place as directed by Architect.

END OF SECTION

SECTION 02921

SOIL PREPARATION & SOIL MIXES

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and apply soil amendments as described in Contract Documents.

B. Related Sections
   1. Section 02001 - General Sitework Requirements
   2. Section 02212 - Finish grading

1.2 SUBMITTALS

A. See Section 01300.

B. Samples - Submit sample of workability soil amendment for approval before delivery to site.

C. Quality Control - Submit delivery slips indicating amount of workability soil amendment delivered to Project site.

1.3 QUALITY ASSURANCE

A. Pre-Installation Meetings
   1. See Section 01200.
   2. Participate in pre-installation meeting specified in Section 02211.
   3. Schedule landscaping pre-installation meeting after completion of finish grading but prior to beginning landscape work.

PART 2 PRODUCTS

2.1 MATERIAL

A. Workability Soil Amendments
   1. Canadian Sphagnum Peat Moss, "Nutri Mulch", "Soil Pep", or nitrogen stabilized organic amendment (not sawdust).

PART 3 EXECUTION

3.1 PREPARATION

A. Protection
   1. Take care in performing work of this Section to avoid conditions which will create hazards. Post signs or barriers as required.
   2. Provide adequate means for protection from damage through excessive erosion, flooding, heavy rains, etc. Repair or replace damaged areas.

END OF SECTION

SECTION 02950

TREES, PLANTS, & GROUND COVER

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install landscaping plants as described in Contract Documents.

B. Related Sections
   1. Section 02001 - General Sitework Requirements

1.2 SUBMITTALS

A. Samples
   1. Sample of top dressing mulch for approval before delivery to site.

1.3 QUALITY ASSURANCE

A. Pre-Installation Meetings
   1. Participate in pre-installation meetings specified in Sections 02211 and 02921.

1.4 WARRANTY

A. Guarantee furnished shrubs, trees, ground covers, and vines to live and remain in healthy condition for 90 days minimum from date landscape installation is accepted as complete.

1.5 OWNER'S INSTRUCTIONS

A. Provide written instructions on maintenance requirements for final 60 days of 90 day guarantee period not covered by maintenance period specified in Section 02970.

PART 2 PRODUCTS

2.1 MATERIALS

A. Plants
   1. Conform to requirements of Plant List and Key on Drawings and to "Horticultural Standards" of AAN as to kind, size, age, etc.
   2. Nomenclature - Plant names used in Plant List conform to "Standardized Plant Names" by American Joint Committee on Horticultural Nomenclature except in cases not covered. In these instances, follow custom of nursery trade. Plants shall bear a tag showing the genus, species, and variety of at least 10 percent of each species delivered to site.
   3. Quality -
      a. Plants shall be sound, healthy, vigorous, free from plant disease, insect pests or their eggs, noxious weeds, and have healthy, normal root systems. Container stock shall be well established and free of excessive root-bound conditions.
      b. Do not prune plants or top trees prior to delivery.
      c. Plant materials shall be subject to approval by Architect as to size, health, quality, and character.
      d. Bare root trees are not acceptable.
      e. Provide plant materials from a licensed nursery.
   4. Measurements -

a. Measure height and spread of specimen plant materials with branches in their normal position as indicated on Drawings or Plant List.
b. Measurement should be average of plant, not greatest diameter. For example, plant measuring 15 inches in widest direction and 9 inches in narrowest would be classified as 12 inch stock.
c. Plants properly trimmed and transplanted should measure same in every direction.
d. Measure caliper of trees 6 inches above surface of ground.
e. Where caliper or other dimensions of plant materials are omitted from Plant List, plant materials shall be normal stock for type listed.
f. Plant materials larger than those specified may be supplied with approval of Architect -
1) If complying in all other respects.
2) If at no additional cost to Owner.
3) If sizes of roots or balls are increased proportionately.

5. Shape and Form -
a. Plant materials shall be symmetrical or typical for variety and species and conform to measurements specified in Plant List.
b. Well grown material will generally have height equal to or greater than spread. However, spread shall not be less than 2/3 height.

B. Planting Mix - Mixture of three parts good topsoil and one part rotted composted manure.

C. Planting Tablets - 21 gram Agriform (20-10-5).

D. Tree Stakes
1. 2 inch diameter Lodgepole Pine
2. Steel T-posts

E. Tree Staking Ties - 16 ga wire with new rubber hose or strap to protect tree.

F. Tree Wrap
1. Standard burlap
2. Heavy crepe paper

G. Tree Base Protection
1. Approved Manufacturers -
a. Tree Boot
b. Arbor Gard
c. Equal as approved by Architect before bidding. See Section 01600.

H. Pre-Emergent Herbicide
1. Approved Manufacturers -
a. Elanco XL
b. Ronstar
c. Surflan

I. Bark Or Wood Top Dressing Mulch
1. "Walk-on-Bark" Fir bark.
2. Medium or large size Redwood bark.
3. Shredded pine bark.
4. Shredded Cedar

PART 3 EXECUTION

3.1 EXAMINATION

A. Before proceeding with work, check and verify dimensions and quantities. Report

variations between Drawings and site to Architect before proceeding with work of this Section.

B. Plant totals are for convenience only and are not guaranteed. Verify amounts shown on Drawings. All planting indicated on Drawings is required unless indicated otherwise.

3.2 PREPARATION

A. Protection
   1. Take care and preparation in work to avoid conditions which will create hazards. Post signs or barriers as required.
   2. Provide adequate means for protection from damage through excessive erosion, flooding, heavy rains, etc. Repair or replace damaged areas.

B. Layout individual tree and shrub locations and areas for multiple plantings. Stake locations and outline areas. Secure Architect's acceptance before planting. Make minor adjustments as may be requested.

3.3 INSTALLATION

A. Interface With Other Work
   1. Do not plant trees and shrubs until major construction operations are completed.

B. Excavation
   1. If underground construction work or obstructions are encountered in excavation of tree holes, Architect will select alternate locations.
   2. Excavation Size -
      a. Diameter -
         1) Plant plants delivered in one gallon cans in holes 12 inches in diameter.
         2) Plant plants delivered in 5 gal cans in holes at least 2 feet in diameter.
         3) Plant trees, both balled and boxed, in holes at least three times greater in diameter than root ball.
      b. Depth -
         1) Holes for shrubs shall be deep enough to allow 6 inches minimum of tamped topsoil beneath root ball.
         2) Holes for trees shall be 4 inches minimum deeper than bottom of root ball.
   3. Unless excavated material meets topsoil requirements as specified in Section 02 212, remove from landscape areas and do not use for landscaping purposes.
   4. Roughen sides and bottoms of excavations.
   5. After hole is excavated to proper depth, fill with good, tamped topsoil sufficient to bring plant to proper elevation after watering and settling.
   6. In heavy clay soils or where hard pan exists, auger 8 inch hole 6 feet deep or through hard pan. Fill hole with amended topsoil.

C. Planting
   1. Prior to planting, fill hole with water and verify that water drains away within two hours so there will be no drainage problem after tree or shrub is planted. Inform Architect in writing if water does not drain properly. Do not plant trees or shrubs in holes that do not properly drain.
   2. Removing Binders & Containers -
      a. Remove top 1/3 of wire basket and burlap binders.
      b. Remove entirely plastic and twine binders from around root ball.
      c. Remove entirely wood boxes from around root ball. Remove box bottoms before positioning plant in hole. After plant is partially planted, remove remainder of box without injuring root ball.
   3. Plant immediately after removing binding material and containers. Place trees and shrubs in holes so, after watering and settling and in relation to finished grade, plant

shall be approximately one inch higher than natural grade.

4. Properly cut off broken or frayed roots.
5. Center plant in hole and backfill with specified planting mix making ring of mounded soil around hole's perimeter to form watering basin.
6. Add planting tablets in plant pit as follows -
   a. One Gallon Shrub - 1 tablet
   b. 5 Gallon Shrub/Tree - 3 tablets
   c. 15 Gallon Tree - 4 tablets
   d. 24 inch Box Tree - 6 Tablets
7. Settle by firming and watering to bring ball down to proper level, just slightly higher than surrounding soil.
8. Do not use muddy soil for backfilling.
9. Make adjustments in positions of plants as directed by Architect.
10. Thoroughly water trees and shrubs immediately after planting.
11. At base of each tree, leave 24 inch diameter circle free of any grass.

D. Supports for New Trees
1. In planting, include placement of adequate support for trees noted on Drawings to be staked.
2. Support shall consist of at least two tree stakes driven into hole base before backfill so roots are not damaged.
3. Place stakes vertically and run parallel to tree trunk. Remove nursery stakes attached to tree.
4. Place tree ties 6 to 12 inches below crotch of main tree canopy. Second set of tree ties may be required 18 to 24 inches above finish grade, if directed by Architect.
5. Remove tops of tree stakes 6 inches below main tree canopy to prevent damage to tree branches and canopy growth.
6. Support for 24 inch box and larger trees shall be guyed as indicated on Drawings.

E. Tree Wrap
1. Wrap new deciduous tree trunks promptly after planting and prior to staking.
2. Apply material in 6 to 10 inch wide strips spirally from ground line to second finished branches.
3. Wrapping shall be neat and snug, and material held in place by suitable non-plastic cord.

F. Tree Base Protection - Install tree base protection on trees located in turf areas to prevent damage to tree from line trimmers and lawn mowers.

G. Vines - Remove from stakes, untie, and securely fasten to wall or fence next to which they are planted.

H. Ground Covers - Container-grown unless otherwise specified on Drawings. Space evenly to produce a uniform effect, staggered in rows and intervals shown.

I. Post Planting Weed Control
1. Apply specified pre-emergent herbicide to shrub and ground cover planting areas after completion of planting.
2. Planting areas shall be free of existing weed growth prior to application of herbicide.
3. Apply herbicide in accordance with Manufacturer's recommendations.

J. Mulching
1. After application of herbicide, mulch shrub and ground cover planting areas with 2 inch deep layer of specified top dressing mulch.
2. Place top dressing mulch to uniform depth and rake to neat finished appearance.

END OF SECTION

SECTION 03110

CAST-IN-PLACE CONCRETE FORMWORK

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Design, construction, and safety of formwork.
   2. Furnish and install required formwork ready for placing of concrete.
   3. Strip and dispose of formwork.

B. Related Sections
   1. Section 03313 - Tolerances for placed concrete

1.2 SUBMITTALS

A. Quality Assurance/Control - Manufacturer's application instructions for form release agent.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Forms - Wood, metal, or plastic as arranged by Contractor. Forming material shall be compatible with specified form release agents and with finish requirements for concrete to be left exposed or to receive decorative finish.

B. Form Release Agents
   1. Chemically acting type
   2. Approved Manufacturers -
      a. Crete-Lease 727 or 20-VOC by Cresset Chemical Co, Weston, OH (800) 367-2020
      b. DEBOND Form Coating by L & M Construction Chemicals, Omaha, NE (800) 362-3331
      c. Equal which will provide CCS-2 surface minimum as approved by Architect before bidding. See Section 01600.

PART 3 EXECUTION

3.1 INSTALLATION

A. Forms
   1. Assemble forms so forms are sufficiently tight to prevent leakage.
   2. Properly brace and tie forms.
   3. Provide temporary cleanouts at base of tall forms to facilitate cleaning and inspection.
   4. Make proper form adjustments before, during, and after concreting.
   5. Use new forms, or used forms that have been cleaned of loose concrete and other debris from previous concreting and repaired to proper condition. Provide smooth liner on forms used for concrete to be exposed if necessary to attain specified finish quality.
   6. Use metal cold joint forms when unable to place concrete for footings, foundations, and slabs in continuous pours.

B. Accessories
   1. Provide for installation of inserts, templates, fastening devices, and other accessories to be set in concrete prior to placing.
   2. Position anchor bolts for hold-down anchors and columns and securely tie in place prior to placing concrete.

C. Form Release Agents
   1. Apply in accordance with Manufacturer's recommendations.
   2. Film thickness shall be no thicker than as recommended by Manufacturer to attain specified finish. Finish shall be of quality equal to CCS-1 or CCS-2 surface as defined by Cresset Chemical.

3. Allow no release agent on reinforcing steel or footings.

D. Form Removal - Removal of forms can usually be accomplished in 12 to 24 hours. If temperature is below 50 deg F or if concrete (stairs, beams, etc) depends on forms for structural support, leave forms intact for sufficient period for concrete to reach adequate strength.

END OF SECTION

SECTION 03210

CONCRETE REINFORCING STEEL

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnishing and installing reinforcing as described in Contract Documents.

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM A 615-90, "Standard Specification for Deformed & Plain Billet-Steel Bars for Concrete Reinforcement"

1.3 SUBMITTALS

A. See Section 01300.

B. Quality Assurance/Control
   1. Provide reinforcing placement drawings.
   2. If requested by Architect, provide mill certificate.

1.4 DELIVERY, STORAGE, & HANDLING

A. Reinforcing steel shall be free of rust, scale, or other coating at time of delivery and placing. Properly protect rebar on site after delivery.

B. Deliver bars separated by size and tagged with manufacturer's heat or test identification number.

PART 2 PRODUCTS

2.1 MATERIAL

A. Reinforcing Steel
   1. Rebars shall have grade identification marks and conform to ASTM A 615.
      a. Grade 60 minimum, except dowels which are to be field bent Grade 40 minimum.
      b. Bars shall be deformed type.
      c. Bars shall be free of rust, scale, or other bond-reducing coatings.

B. Rebar Spacing Blocks
   1. Approved Manufactured Types -
      a. Single cover block with wire by Frank Co, Humbolt, TX
      b. Equals as approved by Architect before bidding. See Section 01600.
   2. Other Approved Types -
      a. Plain concrete blocks.

2.2 FABRICATION

A. Fabricate reinforcing steel according to "ACI Detailing Manual," 1988 edition, and details on Drawings.

PART 3 EXECUTION

3.1 INSTALLATION

A. Site Tolerances
   1. Provide following minimum concrete cover for reinforcement (ACI 318-89) -
      a. Concrete cast against and permanently exposed to earth -
         1) Exterior Slabs on Grade (where shown) - 2 inches
         2) Interior Slabs on Grade - 2 inches
         3) Sections other than Slabs - 3 inches

b. Concrete Exposed to Earth or Weather -
   1) #6 & Larger Bars - 2 inches
   2) #5 & Smaller Bars - 1-1/2 inches
c. Concrete not exposed to weather or in contact with ground -
   1) Slabs, Walls & Joists - 3/4 inches
   2) Beams & Columns -
      Primary Reinforcement, Ties, Stirrups, & Spirals - 1-1/2 inches

B. Bend bars cold.

C. Accurately place and support with chairs, bar supports, spacers, or hangers as recommended by "ACI Detailing Manual," 1988 edition, except slab on grade work. Support bars in slabs on grade and footings with specified rebar spacing blocks to maintain specified concrete cover.

D. Dowel vertical reinforcement for columns or walls out of footing or structure below with rebar of same size and spacing required above.

E. Securely anchor and tie reinforcing bars and dowels prior to placing concrete.

F. Avoid splices of reinforcing bars at points of maximum stress. Lap bars 40 bar diameters minimum unless dimensioned otherwise on the Drawings.

G. Run steel reinforcing bars continuous through cold joints.

END OF SECTION

SECTION 03220

WELDED WIRE FABRIC

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install welded wire fabric as described in Contract Documents for use in reinforcing slabs other than interior slabs-on-grade.

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM A 185-90a, "Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement"

PART 2 PRODUCTS

2.1 MATERIALS

A. Reinforcing
   1. Flat sheets of welded steel wire fabric for concrete reinforcement meeting requirements of ASTM A 185.
   2. Style - 6 x 6 - W1.4 x W1.4.

B. Spacing Blocks
   1. Approved Manufactured Types -
      a. Single cover block with wire by Frank Co, Humbolt, TX
      b. Equals as approved by Architect before bidding. See Section 01600.
   2. Other Approved Types - Plain concrete blocks.

PART 3 EXECUTION

3.1 INSTALLATION

A. Tie mesh together 2 feet on center minimum with 6 inch overlap.

B. Support wire mesh sheets at 2 feet on center along edges and 2 feet on center minimum each way in field with spacing blocks to maintain mesh in center of slab.

END OF SECTION

SECTION 03252

ANCHORS & INSERTS

PART 1 GENERAL

1.1 SUMMARY

A. Products Supplied But Not Installed Under This Section
   1. Concrete anchors and inserts not specified elsewhere.

B. Related Sections
   1. Section 03313 - Installation
   2. Division 05 - Quality of anchor bolts

1.2 SUBMITTALS

A. See Section 01300.

B. Product Data - Submit Manufacturer's product literature for each item.

C. Quality Control - Submit Manufacturer's installation recommendations for each item.

PART 2 PRODUCTS

2.1 APPROVED MANUFACTURERS

A. Dayton Superior Corp, Miamisburg, OH (800) 745-3700
B. Richmond Screw Anchor Company Inc, Fort Worth, TX (817) 284-4981
C. Equal as approved by Architect before bidding. See Section 01600.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install according to Manufacturer's instructions.

B. Space supports as required to prevent sagging of rebar.

END OF SECTION

SECTION 03313

NORMAL WEIGHT STRUCTURAL CONCRETE

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install Project concrete work as described in Contract Documents.
   2. Quality of concrete used on Project but furnished under other Sections.

B. Products Installed But Not Supplied Under This Section
   1. Inserts, bolts, boxes, templates, and fastening devices for other work, including those for bases only for Mechanical and Electrical.
   2. Concrete accessories.

C. Related Sections
   1. Division 02 -
      a. Cast-in-place concrete site elements
      b. Laminated vapor barrier and granular base course under slabs
      c. Portland cement concrete paving
      d. Cast-in-place retaining walls
   2. Division 04 - Masonry columns and bond beams confined in hollow masonry units.
   3. Divisions 15 & 16 - Mechanical and electrical devices including boxes, conduits, pipes, hangers, inserts, and other work to be embedded in concrete work prior to placing.
   4. Furnishing of items to be embedded in concrete specified in Section involved.

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM C 33-90, "Specification for Concrete Aggregates"
   2. ASTM C 94-90, "Specification for Ready-Mixed Concrete"
   3. ASTM C 150-89, "Specification for Portland Cement"
   4. ASTM C 260-86, "Specification for Air-Entraining Admixtures for Concrete"
   5. ASTM C 494-92, "Standard Specification for Chemical Admixtures for Concrete"
   6. ASTM C 618-93, "Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete"

1.3 SYSTEM DESCRIPTION

A. Design Requirements
   1. Concrete elements of Project are designed to a value of 2500 psi.

B. Performance Requirements
   1. For testing purposes, following concrete strengths at 28 days are required -
      a. 4500 psi - Exterior, above or on grade concrete exposed to weather
      b. 3000 psi - Concrete not specified elsewhere

1.4 SUBMITTALS

A. See Section 01300.

B. Shop Drawings
   1. Show dimensioned locations of anchor bolts for hold-down anchors and columns.
   2. Concrete mix design.

C. Quality Control Submittals
   1. Delivery Tickets - Require mix plant to furnish delivery ticket for each batch of concrete. Keep delivery tickets at job-site for use of Owner or his representatives. Tickets shall show following -
      a. Name of ready-mix batch plant
      b. Serial number of ticket
      c. Date and truck number
      d. Name of Contractor

e. Name and location of Project
f. Specific class or designation of concrete in conformance with that employed in Project specification
g. Amount of concrete
h. Time loaded
i. Type, name, and amount of admixtures used
j. Amount and type of cement
k. Total water content
l. Sizes and weights of sand and aggregate

1.5 QUALITY ASSURANCE

A. Pre-Installation Meeting
1. See Section 01200.
2. Schedule meeting after placing of footings, installation of forms, installation of reinforcing steel, and installation of anchors, inserts, and blockouts but prior to placing of concrete.
3. In addition to items specified in Section 01 200, review following -
a. Approved mix design and use of admixtures
b. Installation scheduling, coordination, and placement of items installed in and under floor slab
c. Placement, finishing, and curing of concrete

1.6 PROJECT/SITE CONDITIONS

A. Environmental Requirements
1. Cold weather concreting procedures -
a. No frozen materials shall be used.
b. Forms, reinforcement, and fillers shall be free from frost. Place no concrete on frozen ground.
c. For temperatures below 40 deg F, maintain concrete at between 60 and 80 deg F when placing, and 50 deg F minimum for five days if regular concrete, or at 50 deg F for three days if high early strength concrete, or longer if determined necessary by Architect.
d. Housing, covering, or other protection shall remain in place for 24 hours after heat is discontinued.
2. Hot weather concreting procedures -
a. Maximum concrete temperature allowed is 90 deg F in hot weather.
b. Cool aggregate and subgrades by sprinkling.
c. Avoid cement over 140 deg F.
d. Use cold mixing water or ice.
e. Use fog spray to lessen rapid evaporation from concrete surface.

PART 2 PRODUCTS

2.1 MATERIALS

A. Portland Cement - Meet requirements of ASTM C 150, Type _____.

B. Aggregates
1. Coarse -
a. Meet requirements of ASTM C 33 or nonconforming aggregate which by test or actual service produces concrete of required strength and conforms to local governing codes.
b. Aggregate shall be uniformly graded as follows -
1) Flat Work - Size #67 (3/4 inch to #4 or 3/4 maximum to 1/4 inch minimum).
2) All Other - Size #57 (One inch maximum to 1/4 inch minimum).
2. Fine - Meet requirements of ASTM C 33.

C. Water - Clear, apparently clean, and potable.

D. Admixtures -
1. Mineral -
a. Fly Ash Pozzolan - Meet requirements of ASTM C 618, Class F or C and with loss on ignition (LOI) of 3 percent maximum.
2. Chemical -
a. No admixture shall contain calcium chloride nor shall calcium chloride be used as an

admixture. All chemical admixtures used shall be from same manufacturer.

b. Air Entraining Agents - Meet requirements of ASTM C 260.
   1) Quality Standard - Daravair or Darex II AEA by W R Grace.

c. Water Reducer - Meet requirements of C 494, Type A.
   1) Quality Standard - Daracem 50/55 , WRDA-64, or WRDA-82 by W R Grace.

d. Water Reducer, Set Retarder - Meet requirements of ASTM C 494, Type D.
   1) Quality Standard - Daratard-17 or Daratard-40 by W R Grace.

e. High Range Water Reducer - Meet requirements of ASTM C 494, Type F or G.
   1) Quality Standard - Darachem-100 or WRDA-19 by W R Grace.

f. Non-Chloride Accelerator - Meet requirements of ASTM C 494, Type C.
   1) Quality Standard - Daraset or Polarset by W R Grace.

g. Approved Manufacturers -
   1) Master Builders Company, Cleveland, OH (216) 831-5500
   2) Sika Corporation, Lyndhurst, NJ (800) 933-7452
   3) W R Grace Construction Products, Cambridge, MA (800) 521-2737

2.2 MIXES

A. Submit mix designs to meet following requirements -
   1. Proportions
      a. Exterior, above or on grade concrete exposed to weather -
         1) Minimum weight cement per cu yd concrete - 564 lbs
         2) Air Entrainment (plus or minus 1-1/2 percent) - 6 percent
         3) Water/Cement Ratio - 0.45 maximum by weight
      b. Concrete not specified elsewhere -
         1) Minimum weight cement per cu yd concrete - 517 lbs
         2) Air Entrainment (plus or minus 1-1/2 percent) - 3 percent
         3) Water/Cement Ratio - 0.50 maximum by weight
      c. No water shall be added any time during mixing cycle above amount required to meet specified water/cement ratio. No reduction in the amount of cement is allowed.
   2. Admixtures -
      a. Mix design shall show proposed admixture, amount, usage instructions, and justification for proposed use. Do not use any admixture without Architect's written approval.
      b. Mineral - An amount equal to 15 percent of weight of cement may be added. If added, fly ash shall be considered with the cement in determining the amount of water necessary to provide the specified water/cement ratio.
      c. Chemical -
         1) 4 inch slump maximum prior to use of high range water reducer.
         2) 8 inch slump maximum with use of high range water reducer.
         3) Use accelerator or retarder if necessary to meet environmental conditions.

PART 3 EXECUTION

3.1 PREPARATION

A. Inserts, bolts, boxes, templates, pipes, conduits, and other accessories required by Divisions 15 & 16 shall be installed and inspected prior to placing concrete.

B. Install inserts, bolts, boxes, templates, pipes, conduits, and other accessories furnished under other Sections to be installed as part of work of this Section. Tie anchor bolts for hold-down anchors and columns securely to reinforcing steel.

C. Remove water and debris from space to be placed.

3.2 INSTALLATION

A. Site Tolerances
   1. ACI Standards shall govern concrete work except where specified differently.
   2. Variation from plumb - 1/4" maximum
   3. Variation in thickness - 1/4" to 1/2" standard, 5% for footings
   4. Variation in grade -
      a. 0 to 10 feet - 1/4" standard, 1/8" for floor slabs
      b. 10 to 20 feet - 3/8" standard, 1/4" for floor slabs
      c. 40 feet or more - 3/4" standard, 3/8" for floor slabs

5. Variation in plan -
   a. 0 to 20 feet - 1/2"
   b. 40 feet or more - 3/4" standard, plus 1/2" for footings.
6. Variation in eccentricity - 2% for footings
7. Variation in openings -
   a. Size - plus 1/8"
   b. Location - 1/4"
8. Variation in stairs & landings -
   a. Consecutive steps -
      1) Treads - 1/8"
      2) Risers - 1/16"
   b. Flight of stairs -
      1) Treads - 1/4"
      2) Risers - 1/8"

B. Placing
1. Place as soon after mixing as possible. Deposit as nearly as possible in final position. Placing of concrete shall be continuous until a panel or section is complete.
2. Placing Rate - In order to avoid overloading of forms and ties, observe following rate of filling per hour for various air temperatures -

Temperature	Rate of Fill/Hour
40 deg F	2'
50 deg F	3'
60 deg F	4'
70 deg F	5'

3. Compact concrete in forms by vibrating and other means where required. Thoroughly work in concrete around reinforcing bars.
4. Do not embed aluminum in concrete.
5. Do not use contaminated, deteriorated, or retempered concrete.
6. Avoid accumulation of hardened concrete.
7. Locate construction joints where shown on Drawings to least impair strength of completed structure. Construction joints in foundation walls shall not occur within 6 feet of corner and be keyed.

C. Bonding Fresh & Hardened Concrete
1. Retighten forms.
2. Roughen surfaces.
3. Clean off foreign matter and laitance.
4. Wet but do not saturate.
5. Slush with neat cement grout.
6. Proceed with placing new concrete.

D. Special Requirements
1. Footings -
   a. Bear 12 inches minimum into undisturbed earth or on mechanically compacted engineered fill. Step footings at ratio of 1-1/2 horizontal to One vertical unless detailed otherwise. Exterior wall footing shall bear _____ minimum below finish grades.
   b. Level top of finish footing and leave rough.
   c. Where joints are required, bulkhead, key horizontally, and dowel with two #5 rebars, 4 feet long.
2. Foundations & Walls - Leave steel projecting where required for floor tie.
3. Exterior Slabs -
   a. Dusting with cement not permitted.
   b. For continuous placing and where shown on Drawings, saw cut one inch deep control joints before shrinkage occurs.
4. Equipment Bases - Coordinate with appropriate Sections for locations and dimensions.
5. Anchor Bolts - Place anchor bolts not tied to reinforcing steel immediately following leveling of concrete. Reconsolidate concrete around bolt immediately after placing bolt. Do not disturb bolts during finishing process.

E. Finishing
1. Rubbed Finish, Exposed Vertical Surfaces -
   a. Immediately after removing forms, remove joints, marks, bellies, projections, loose materials, and cut back metal ties from surfaces to be exposed.
   b. Point up voids with cement mortar, 1:2 mix, and rub exposed surface with carborundum to smooth, even surface.

2. Steel Trowel Finishes, Interior Flatwork -
   a. Float and steel trowel interior slabs after concrete has set enough to avoid bringing water and fines to surface.
   b. If power troweling is used, get approval of finish from Architect.
3. Broom Finishes, Exterior Flatwork, Stairs, & Ramps -
   a. Broom finish exterior slabs.
   b. Round edges including edges formed by expansion joints.
   c. Remove edger marks.
4. Rough - Top of slabs and stairs to receive ceramic tile.

F. Curing
   1. Keep concrete moist seven days minimum for regular concrete and three days for high early strength. Do not use concrete curing compounds without Architect's written approval. Curing compounds shall not be used to replace moist curing unless accepted by Architect.

3.3 FIELD QUALITY CONTROL

A. Inspection
   1. To allow Architect's verification of grades, notify Architect seven days minimum prior to placing foundation walls and building slabs.

3.4 PROTECTION

A. Protect concrete which has not received its initial set from precipitation to avoid excess water in mix and unsatisfactory surface finish.

END OF SECTION

SECTION 03371

CONCRETE CURING COMPOUNDS

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and apply curing compounds to concrete slabs and exterior flatwork as described in Contract Documents, if approved by Architect in writing prior to use.

B. Related Sections
   1. Division 02 -
      a. Cast-in-place concrete site elements
      b. Portland cement concrete paving
   2. Section 03313 - Normal weight structural concrete

1.2 SUBMITTALS

A. See Section 01300.

B. Product Data - Submit Manufacturer's product data.

C. Quality Control - Submit Manufacturer's printed installation instructions.

PART 2 PRODUCTS

2.1 MATERIALS

A. Interior
   1. Low VOC (less than 300 g/l), water-borne, membrane forming curing compound meeting requirements of ASTM C 309, Type 1D, Class B.
   2. Approved Manufacturers -
      a. Horn Cure 100 by A C Horn
      b. L & M Cure R by L & M Construction Chemicals, Omaha, NE (800) 362-3331
      c. 1100-WD by W. R. Meadows, Benicia, CA (708) 683-4500
      d. Equal as approved by Architect before bidding. See Section 01600.

B. Exterior
   1. Low VOC (less than 300 g/l), water-borne, membrane forming curing compound meeting requirements of ASTM C 309, Type 2.
   2. Approved Manufacturers -
      a. Horn Cure 200 by A C Horn
      b. L & M Cure R-2 by L & M Construction Chemicals, Omaha, NE (800) 362-3331
      c. 1200 White by W. R. Meadows, Elgin, IL (708) 683-4500
      d. Equal as approved by Architect before bidding. See Section 01600.

PART 3 EXECUTION

3.1 APPLICATION

A. Apply in accordance with Manufacturer's instructions.

END OF SECTION

SECTION 03603

NON-METALLIC GROUT

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install grout as described in Contract Documents.
      a. For securing anchor bolts and hardware in concrete and in masonry
      b. As grout base for structural columns and light poles.

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM C 1107-91a, "Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)"

1.3 SUBMITTALS

A. See Section 01300.

B. Quality Assurance - Provide test data confirming compliance with specified ASTM Standard.

PART 2 PRODUCTS

2.1 MATERIALS

A. Commercial nonshrink grout conforming to requirements of ASTM C 1107, Type B or Type C.

2.2 APPROVED MANUFACTURERS

A. 5 Star Grout by Five Star Products Inc, Fairfield, CT (800) 243-2206
B. Crystex non-shrink grout by L&M Construction Chemicals Inc, Omaha, NE (800) 362-3331
C. Masterflow 928 pre-mixed grout by Master Builders Company Division of American Marietta Company, Cleveland, OH (216) 831-5500
D. Equal as approved by Architect Before bidding. See Section 01600.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with Manufacturer's recommendations. Completely eliminate air pockets and provide full contact between grout and item being grouted.

END OF SECTION

SECTION 04101

CEMENT & LIME MORTARS

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Quality of masonry mortar used on Project

B. Related Sections
   1. Section 04200 - Furnish and install mortar

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM C 144-89, "Specification for Aggregates for Masonry Mortar"
   2. ASTM C 150-89, "Specification for Portland Cement"
   3. ASTM C 207-79 (1988), "Specification for Hydrated Lime for Masonry Purposes"

1.3 SYSTEM DESCRIPTION

A. Design Requirements
   1. Use of pre-mixed mortar is not allowed.
   2. Admixtures -
      a. Use no admixtures except for color pigments specified for mortar.
      b. Use of any admixture to meet cold weather requirements is expressly forbidden.
      c. No additives are allowed for air entrainment.

PART 2 PRODUCTS

2.1 MATERIALS

A. Portland Cement - Meet requirements of ASTM C 150, Type II Low Alkali unless approved otherwise in writing by Architect.

B. Hydrated Lime - Meet requirements of ASTM C 207, Type S.

C. Aggregate - Natural or manufactured sand meeting requirements of ASTM C 144 following

Percent Passing Sieve

Sieve Size	Natural Sand	Manufactured Sand
No. 4	100	100
No. 8	95 to 100	95 to 100
No. 16	70 to 100	70 to 100
No. 30	40 to 75	40 to 75
No. 50	10 to 35	20 to 40
No. 100	2 to 15	10 to 25
No. 200	. . .	0 to 10

Fineness modulus - 1.6 to 2.5 percent
Water demand, ratio by weight - 0.65 percent maximum

D. Mortar Color Pigment
   1. High purity, chemically inert, unfading, alkali-fast mineral oxides, finely ground and especially prepared for mortar.
   2. Color as selected by Architect.
   3. Approved Manufacturers -
      a. Solomon Grind-Chem Service Inc, Springfield, IL (217) 522-3112
      b. Davis Colors, Los Angeles, CA (800) 356-4848
      c. Equal as approved by Architect bidding. See Section 01600.

2.2 MIXES

A. Parts by Volume

Type	"N"	"S"
Min comp strength at 28 days (PSI)	750	1800
Portland Cement	1	1
Hydrated Lime	1/2 min to 1-1/4 max	1/4 min to 1/2 max

Damp Loose Sand - 2-1/4 minimum and three maximum, times sum of volumes of cement and lime used.

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 04105

MASONRY GROUT

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Quality of masonry grout used on Project

B. Related Sections
   1. Section 04200 - Furnish and install masonry grout.

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM C 150-89, "Specification for Portland Cement"
   2. ASTM C 207-79 (1988), "Specification for Hydrated Lime for Masonry Purposes"
   3. ASTM C 404-87, "Specifications for Aggregates for Masonry Grout"

PART 2 PRODUCTS

2.1 MATERIALS

A. Portland Cement - Meet requirements of ASTM C 150. Use Type II Low Alkali in exterior walls or in walls subject to moisture unless approved otherwise in writing by Architect.

B. Hydrated Lime - Meet requirements of ASTM C 207, Type S.

C. Aggregate
   1. Meet requirements of ASTM C 404, Table 1.
      a. Fine Aggregate, Natural, Size 2 -

Sieve Size	Weight Percent
No. 4	100
No. 8	95 to 100
No. 16	60 to 100
No. 30	35 to 70
No. 50	15 to 35
No. 100	2 to 15

      b. Coarse Aggregate, Size 8 -

1/2"	100
3/8"	85 to 100
No. 4	10 to 30
No. 8	0 to 10
No. 16	0 to 5

2.2 MIXES

A.

Type	Fine Grout	Coarse Grout
Portland Cement - cu ft	1	1
Hydrated Lime - cu ft (optional)	1/10	1/10
Damp, Loose Sand - cu ft	2-1/4 to 3	2-1/4 to 3
Pea Gravel - cu ft	. . . .	1 to 2

Water - Only enough to give creamy pouring consistency.

B. Use a one cu ft box in measuring proportions for grout mixed on site.

C. No additives are allowed for air entrainment.

PART 3 EXECUTION

3.1 INSTALLATION

A. Use fine grout for cavities 2 inches and smaller in smallest dimension. Use coarse grout for cavities greater than 2 inches in smallest dimension.

END OF SECTION

SECTION 04151

ANCHOR & TIE SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Products Supplied But Not Installed Under This Section
   1. Ties for veneering masonry on framed walls.
   2. Masonry veneer horizontal seismic reinforcing.
   3. Dovetail anchors and slots for veneering masonry on cast-in-place concrete.

B. Related Sections
   1. Section 04200 - Installation of anchor and tie system
   2. Division 03 - Installation of dovetail slots

PART 2 PRODUCTS

2.1 MANUFACTURED UNITS

A. Masonry Over Stud Framing
   1. Brick Ties -
      a. Quality Standard -
         1) D/A 431 SRA and two D/A 808 or 807 screws by Dur-O-Wal Inc
   1. Brick Ties -
      a. Quality Standard -
         1) Seismic D/A 213S with 14 ga plate, 12 ga seismic steel pintle, and two D/A 808 or 807 screws by Dur-O-Wal Inc
   2. Masonry Veneer Horizontal Seismic Reinforcing - 9 gauge galvanized steel pencil rod in straight lengths.

B. Dovetail Anchors
   1. Quality Standard
      a. Dovetail Slots - D/A 100 by Dur-O-Wal Inc
      b. Dovetail Anchors - D/A 131 by Dur-O-Wal Inc

2.2 APPROVED MANUFACTURERS

A. Dur-O-Wal Inc, Arlington Heights, IL (708) 577-6400
B. Heckman Building Products Inc, Chicago, IL (800) 621-4140
C. Hohmann & Barnard/AA Wire Products, Hauppauge, NY (516) 234-0683
D. Masonry Reinforcing Corporation of America, Charlotte, NC (800) 849-6722
E. National Wire Products Industries, Baltimore, MD (800) 638-4952
F. Southern Construction Products Inc, Birmingham, AL (800) 821-9296
G. Equal as approved by Architect before bidding. See Section 01600.

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 04161

HORIZONTAL JOINT REINFORCING

PART 1 GENERAL

1.1 SUMMARY

A. Products Supplied But Not Installed Under This Section
   1. Masonry horizontal joint reinforcing used as brick ties.

B. Related Sections
   1. Section 04200 - Installation

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM A 82-90a, "Specification for Steel Wire, Plain, for Concrete Reinforcement"
   2. ASTM A 153-82 (1987), "Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware"
   3. ASTM A 641-92, "Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire"

1.3 DELIVERY, HANDLING, & STORAGE

A. Tag with Manufacturer's name, wire size, and ASTM specification.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Double Wythe Masonry Walls
   1. Reinforcing shall conform to ASTM A 82. Exterior wall reinforcing shall be galvanized to meet requirements of ASTM A 153, Class B-2. Interior wall reinforcing shall be galvanized to meet requirements of ASTM A 641, Class A.
   2. Size - 2 inches less than nominal thickness of wall.
   3. Rod Size -
      a. Side rods - 9 gauge
      b. Cross rods - 9 gauge (unless noted otherwise)
   4. Cross Rods - Cross rods which serve as metal ties in exterior cavity and other multi-wythe walls shall be drip crimped.
   5. Corners & Tee Sections - Prefabricated of material and design similar to main reinforcement.
   6. Quality Standards -
      a. Dur-O-Wal Ladur-Eye 9 gauge with 3/16 inch diameter wire pintle with two legs where wythes do not course out together. Where wythes do course out together, 9 ga Dur-O-Wal Ladur Trirod may be used.
      a. Dur-O-Wal Seismic Duro-Eye with 12 gauge seismic plate pintle and with 9 gauge continuous pencil rod at veneer anchors where wythes do not course out together. Where wythes do course out together, 9 ga Dur-O-Wal Ladur Trirod may be used.
   7. Approved Manufacturers -
      a. Dur-O-Wal Inc, Arlington Heights, IL (708) 577-6400
      b. Heckman Building Products Inc, Chicago, IL (800) 621-4140
      c. Hohmann & Barnard/AA Wire Products, Hauppauge, NY (516) 234-0683
      d. Masonry Reinforcing Corporation of America, Charlotte, NC (800) 849-6722
      e. National Wire Products Industries, Baltimore, MD (800) 638-4952
      f. Southern Construction Products Inc, Birmingham, AL (800) 821-9296
      g. Equal as approved by Architect before bidding. See Section 01600.

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 04162

MASONRY REINFORCING STEEL

PART 1 GENERAL

1.1 SUMMARY

A. Products Supplied But Not Installed Under This Section
   1. Masonry reinforcing steel

B. Related Sections
   1. Section 04200 - Installation

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM A 615-90, "Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcing"

1.3 SUBMITTALS

A. See Section 01300.

B. Quality Assurance/Control
   1. Provide reinforcing bar placement drawings.
   2. Provide mill certificate upon Architect's request.

1.4 DELIVERY, HANDLING, & STORAGE

A. Reinforcing steel shall be free of rust, scale, or other bond-reducing coating at time of delivery and placing. Properly protect rebar on site after delivery.

B. Separate bars by size and tag with manufacturer's heat or test identification number.

PART 2 PRODUCTS

2.1 MATERIALS

A. Rebars shall have grade identification marks and meet requirements of ASTM A 615, Grade 60 minimum. All but No. 2 bars shall be deformed type.

2.2 FABRICATION

A. Fabricate and bend reinforcing steel according to 1988 edition of "ACI Detailing Manual" and details on Drawings.

PART 3 EXECUTION

3.1 INSTALLATION

A. Interface With Other Work - Coordinate with Division 03 for placement of dowels out of foundations for masonry reinforcing.

END OF SECTION

SECTION 04175

WEEP VENTS

PART 1 GENERAL

1.1 SUMMARY

A. Products Supplied But Not Installed Under This Section
   1. Weep vents

B. Related Sections
   1. Section 04200 - Installation

PART 2 PRODUCTS

2.1 MANUFACTURED UNITS

A. Quality Standards
   1. Plastic Weep Vents - AA223KW by Hohmann & Barnard/AA Wire Products

B. Approved Manufacturers
   1. AA Wire Products, Chicago, IL (312) 386-6700
   2. Dur-O-Wal, Baltimore, MD (708) 577-6400
   3. Hohmann & Barnard, Haupauge, NY (516) 234-0683
   4. National Wire Products Industries Inc, Baltimore, MD (800) 638-4952
   5. Equal as approved by Architect before bidding. See Section 01600.

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 04220

CONCRETE UNIT MASONRY (Block)

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install concrete unit masonry as described in Contract Documents.
   2. Furnish and install anchor bolts as described in Contract Documents.
   3. Grout door frames installed in masonry walls.

B. Products Installed But Not Supplied Under This Section
   1. Division 07
      a. Rigid insulation
      b. Reglets

C. Related Sections
   1. Division 05 - Quality of anchor bolts
   2. Division 08 - Door Frames
   3. Division 08 - Window frames
   4. Division 15 - Wall vents & louvers

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM C 90-90, "Specification for Hollow Load-Bearing Concrete Masonry Units"
   2. ASTM C 331-89, "Specification for Lightweight Aggregates for Concrete Masonry Units"

1.3 QUALITY ASSURANCE

A. Job Mock-Ups
   1. 4 feet long x 3 feet high of proposed color range, texture, bond, mortar, and workmanship.
   2. Do not start work until Architect has accepted sample panel.
   3. Use panel as standard of comparison for masonry work built of same material.

B. Pre-Installation Meeting
   1. See Section 01200.
   2. Schedule meeting during construction of mock-up.

1.3 QUALITY ASSURANCE

A. Job Mock-Ups & Pre-Installation Meeting
   1. See Section 04211.

1.4 DELIVERY, STORAGE, & HANDLING

A. Protect block from moisture and keep dry prior to laying. Keep materials free of ice and snow. Dry out units which fail to meet moisture content limitation during storage on job and do not lay until tests prove them satisfactory.

B. Place no units directly on ground while being stored.

1.5 PROJECT/SITE CONDITIONS

A. Environmental Requirements
   1. Cold weather, as referred to in this Section, is four hours below 40 deg F in a 24 hour period.
   2. Do not lay masonry when temperature is below 40 deg F unless authorized by Architect in writing.
   3. Heat water and sand 140 deg F maximum if temperature is below 40 deg F.
   4. Temperature of mortar shall be between 70 and 120 deg F when used.
   5. Heat hollow masonry units to 40 deg F when temperature is below 18 deg F.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Concrete Masonry Units
   1. Meet requirements of ASTM C 90, Type I, moisture control units, light weight classification.
      a. 85 lb/cu ft minimum weight classification.
      b. Lightweight aggregates conforming to ASTM C 331.
   2. Re-crushed masonry units shall not be used as aggregate.
   3. Use one inch bullnose corner units at outside corners except where shown otherwise.
   4. Use special shapes as required.
   5. Uniform color and texture with unbroken edges.

B. Mortar - Use Type "S" mortar as specified in Section 04101.

2.2 ACCESSORIES

A. Cleaning Compounds
   1. 202 or 202V by Diedrich Technologies, Oak Creek (Milwaukee), WI (800) 323-3565
   2. "Surekleen" #600 or Vana-Trol by ProSoCo Inc, Kansas City, KS (913) 281-2700

B. Granular Fire Protection - Zonolite water repellant Vermiculite "Masonry Fill Insulation" of expanded perlite graded with U S Standard screen mesh minus 4 to plus 6.

PART 3 EXECUTION

3.1 INSTALLATION

A. Step back unfinished work for joining with new work. Use toothing only with Architect's approval.

B. Layout - Running bond except where indicated otherwise.

C. Laying
   1. Lay hollow masonry units dry. Do not lay masonry on frozen material.
   2. Align cells or cavities to preserve an unobstructed cavity for grouting.
   3. Full bedding required on both webs and face shell under first course. Other courses need only face shell bedding except where bedding is needed to control the flow of grout.
   4. Use mortar within two hours of initial mixing. Discard mortar that has begun to set.
   5. Make cuts proper size to accommodate work of other trades.

D. Joints
   1. Approximately 3/8 inch wide.
   2. Tool concave. Fill completely except where indicated differently.
   3. Do not tool until mortar has taken initial set.

E. Reinforcing
   1. Reinforcing shall be free of material that may destroy bond.
   2. Joint Reinforcing -
      a. Beginning approximately 8 inches from base of masonry, provide joint reinforcing 16 inches on center vertically in CMU walls with brick veneer, except 8 inches on center if drip crimped.
      b. Maximum offset between brick and block coursing is 1-1/4 inch using Ladur-Eye or Seismic-Eye type reinforcing. If brick and block coursing is exactly lined up, standard Ladur type Dur-O-Wal type reinforcing may be used. However, such reinforcing may not be bent to fit coursing which does not line up.
      c. Lap splices and intersections a minimum of 6 inches.
   3. Anchor & Tie Systems - Install as detailed with maximum spacing of 16 inches vertically and horizontally unless noted otherwise on Drawings.
   4. Masonry Reinforcing Steel -
      a. Place steel as shown on Drawings.
      b. Hold vertical reinforcing in place every 32 inches.
      c. Splice 48 bar diameters minimum.
      d. Place reinforcing and dowels before pouring grout.
      e. Dowel vertical reinforcing bars out of structure below with bars of same size and spacing.
      f. Place horizontal bars in 8 inch deep bond beam units at top of wall and at 48 inches

on center between. Continue bond beam units and reinforcement uninterrupted around corners and across wall intersections.

g. Place special vertical bars of same size as normal vertical reinforcement at corners and jambs of openings and recesses where bond beams are interrupted and at beam bearing locations not otherwise detailed.

h. Unless detailed otherwise, place special horizontal bars of same size as normal reinforcing above and below openings. Extend bars 24 inches minimum beyond opening.

F. Grouting

1. Fully grout cells as follows -
   a. Cells containing reinforcing bars
   b. All cells in concrete block foundations
   c. All cells where sound control requirements are indicated
   d. Bond beams and lintel blocks
2. Place grout in 4 foot maximum lifts.
3. Consolidate grout by means of a mechanical vibrator. Do not use cell reinforcing to rod grout.
4. Before loss of plasticity, mechanically reconsolidate grout.
5. Grout hollow metal door frames solid.

G. Granular Fire Protection

1. Insulate ungrouted cells in exterior walls required to have four hour fire-rating.
2. Fill cells every 24 inches as masonry is laid up to insure complete fill.
3. Keep block cells clean of material other than specified insulation.
4. Keep temporary waterproof covers over fill until roof decking is in place to prevent entrance of water.

3.2 CLEANING

A. Point holes in joints. Fill and tool properly.

B. After mortar has hardened, wet block and clean with specified cleaning compound. Use stiff fibered brush for application. Rinse masonry surfaces with water immediately after cleaning. Leave masonry clean, free of mortar daubs, and with tight mortar joints.

C. Remove and replace defective material at Architect's direction and at no cost to Owner.

D. Clean up masonry debris and remove from site.

3.3 PROTECTION

A. Protect masonry with cover during rainy weather.

B. Cover work at end of each work day with tarpaulins if temperature is 25 to 40 deg F. If temperature is below 25 deg F, protect with heaters. Maintain temperature around masonry to 40 deg F minimum for 48 hrs if Type I, 24 hrs if Type III, or longer if required.

C. Brace masonry walls until walls attain adequate strength and are tied into building structure.

D. Do not allow structural loading of masonry walls until walls attain adequate strength.

END OF SECTION

SECTION 06 115

SHEATHING

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install wood sheathing required for walls as described in Contract Documents.

1.2 SUBMITTALS

A. Quality Assurance/Control
   1. Submit technical and engineering data on nails to be set by nailing guns for Architect's approval of types proposed to be used as equivalents to specified hand set nails.

1.3 QUALITY ASSURANCE

A. Pre-Installation Meeting
   1. As scheduled.

1.4 DELIVERY, STORAGE, & HANDLING

A. Protect sheathing and keep under cover in transit and at job site.

B. Do not deliver material unduly long before it is required.

C. Store sheathing on level racks and keep free of ground. Stack to insure proper ventilation and drainage.

PART 2 PRODUCTS

2.1 MATERIALS

A. General
   1. Meet Requirements of PS 1-83/ANSI A199.1 except where APA Performance Rated units are specified. Every sheet shall bear appropriate APA grade stamp identifying species of plywood or by Certificate of Inspection issued by approved lumber grading or inspection bureau or agency listed above.
   2. Plywood shall not exceed 18% moisture content when fabricated nor more than 19% when installed.
   3. This specification is written for APA Performance Rated Plywood. Waferboard, Composite board, and Oriented Strand Board (but not Structural Particle-board) are accepted as equals providing specified span ratings are met. In all cases, thickness shown is minimum regardless of span rating. Material used for same purpose shall be of same thickness.
   4. Panels shall be stamped 'Sized for Spacing'.

B. Nails
   1. 15/32 inch & thicker panel - 10d common or galvanized box.

PART 3 EXECUTION

3.1 INSTALLATION

A. General
   1. Top of nail heads shall be flush with sheathing surface.

B. Wall Sheathing
   1. Spacing -
      a. Provide 1/8 inch space between sheets at end and side joints.
      b. Stagger panel end joints.
   2. Edge Bearing & Blocking -
      a. Panel edges shall bear on framing members and butt along their center lines.
      b. Back block panel edges which do not bear on framing members with 2 inch nominal framing.
   3. Nailing - Place nails not less than 3/8 inch in from edge and 12 inches on center along intermediate supports and 4 inches on center along panel edge unless shown otherwise on drawings.
   4. Thickness - 15/32 inch minimum.

END OF SECTION

SECTION 06190

WOOD TRUSSES (Trussed Rafters)

PART 1 GENERAL

1.1 SUMMARY

A. Products Supplied But Not Installed Under This Section
   1. Wood roof trusses
   2. Trussed blocking for roof trusses
   3. Prefabricated speaker enclosure framing

B. Related Sections
   1. Section 06110 -
      a. Storage and handling of trusses on Project site
      b. Installing, securing, bracing, etc
      c. Required blocking other than trussed blocking

1.2 SUBMITTALS

A. See Section 01300.

B. Shop Drawings
   1. Base shop drawings on member stresses and requirements of Contract Documents. Use same truss configuration and panel point locations as shown on Project Drawings. Joint configurations may be modified to allow double cut webs.
   2. Include following on submitted shop drawings -
      a. Allowable loads in lbs per effective nail or lbs per sq inch for lumber and plates used as allowed by ICBO and current ICBO report number.
      b. Stress reduction factors used for plates and lumber.
      c. Top and bottom chord design loads in psf.
      d. Size, thickness, and exact location by dimension of plates.
      e. Lumber species and grades used.
      f. Stamp and signature of Engineer responsible for preparation of shop drawings.
      g. Name and trademark of Plate Manufacturer if metal plates are used.
      h. Name and address of Truss Fabricator and Project name and address.

1.3 QUALITY ASSURANCE

A. Truss Fabricators shall have plant inspected four times per year by an independent testing laboratory in accordance with TPI regulations. Make copies of inspections available to Architect upon request.

1.4 DELIVERY, HANDLING, & STORAGE

A. Notify Architect two days minimum before arrival of trusses to allow for scheduling of truss inspection on site prior to unloading and for monitoring of unloading procedure.

B. Unload trusses at site only in Architect's presence and after acceptance by Architect.

C. Unload trusses as outlined in TPI Pamphlet "Handling, Installing, Erecting, & Bracing Wood Trusses - HIB-91".

PART 2 PRODUCTS

2.1 MATERIALS

A. Top & Bottom Chords & Web Members

1. Of quality to meet or exceed stress grade requirements given in table below for each lumber classification and to meet requirements for dimension lumber in Section 06 110. Truss members not called out on Drawings shall meet or exceed stresses of classification C.

a. Of quality to meet minimum stress grade requirements given in table below -

2x4 (nominal) Members -

	A	B	C
Fb (repetitive)	2300 psi	1950 psi	1650 psi
Ft	1150 psi	1000 psi	825 psi
Fv	90 psi	90 psi	90 psi
Fc Perpendicular	405 psi	405 psi	405 psi
Fc Parallel	1550 psi	1250 psi	975 psi
E	1,700,000 psi	1,700,000 psi	1,600,000 psi

2x6 (nominal) Members -

Fb (repetitive)	2000 psi	1700 psi	1400 psi
Ft	1150 psi	975 psi	625 psi
Fv	90 psi	90 psi	90 psi
Fc Perpendicular	405 psi	405 psi	405 psi
Fc Parallel	1350 psi	1250 psi	1000 psi
E	1,700,000 psi	1,700,000 psi	1,600,000 psi

a. Of quality to meet minimum stress grade requirements given in table below. Stresses shown are for Southern Pine or Douglas Fir No. 2 and are allowable for repetitive use. Other lumber species and grades which meet or exceed these stresses may be used.

	Class C	Class B	
	2x6's	2x4's	2x6's
Fb Bending	1495	1510	1310
Ft Tension	880	825	725
Fv Shear	75	75	75
Fc Perpendicular	405	405	405
Fc Parallel	1485	1495	1430
E	$1.5x10^6$	$1.5x10^6$	$1.5x10^6$

b. Allowable stresses shown are for normal duration of load and repetitive member use.

c. Following machine stress rated lumbers may be substituted for the above lumbers provided the combined stress ratio for each member is less than 1.0 by National Design Specification for Wood formulas, 1991. Total load deflection is less than L/240 and live load deflection is less than L/360.

A	B	C
2100f - 1.8E	1800f - 1.6E	1650f - 1.5E

B. Metal Gusset Plates

1. Plate design and manufacture shall be as approved by "The Research Committee for the ICBO". Plates shall be galvanized or otherwise protected from corrosion.
2. Manufacturer's name or trademark shall be visible on plates.
3. Approved Manufacturers -
   a. Alpine Engineered Products Inc, Pompano Beach, FL
   b. Clary Corp, Grand Prairie, TX
   c. Computrus Inc, Corona, CA
   d. Lumbermate Co, St Louis, MO
   e. Mitek Industries, Rancho Cordova, CA
      1) Bemax, Miami Lakes, FL
      2) Gang-Nail Systems Inc, Miami, FL
      3) Hydro-Air Engineering Inc, St Louis, Mo
      4) Inter-Lock Steel Company, Hermitage, PA
      5) Panel-Clip Co, Farmington, MI
   f. Robbins Manufacturing Co, Tampa, FL
   g. Tee-Lok Corp, Edenton, NC

h. Truswal Systems Corp, Madison Heights, MI

2.2 FABRICATION

A. General
1. Fabrication of trusses shall be as approved by ICBO except that this Specification shall govern when it exceeds ICBO requirements.
2. Fabricate trusses from approved shop drawings.
3. Fabricate trusses in jigs with members accurately cut to provide good bearing at joints. Joints shall be acceptable if the average opening between ends of members immediately after fabrication is less than 1/16 inch, except that truss compression chord joints at splices and ridges shall have full contact between members.
4. Each chord section shall be involved in two panel points before being spliced.
5. Provide 1/8 inch camber for each 6 feet of truss unless otherwise indicated.
6. Approved Fabricators - Approved fabricators shall fabricate trusses in accordance with Contract Documents including use of specified gusset plates.
a.
b.
c.
d.

B. Metal Gusset Plates
1. Member forces used for design of plates shall be those shown on Drawings, except as follows -
a. Member forces derived from structural analysis may be used if within plus or minus 6 percent of forces shown on Drawings.
b. Use member forces derived from structural analysis if greater than 6 percent of forces shown on Drawings.
2. No panel point shall have more than one plate per truss side
3. Plates shall have minimum bite of 2-1/2 inches on members. Measure bite along center line of webs and perpendicular to chord axes. Orient plate axis parallel with truss chord axis except where chords change pitch at joint.
4. Plate Sizes -
a. Minimum width of plates shall be 3 in.
b. Trusses Other Than Scissor Trusses - Size plates, nail and steel section, for 135 percent of member forces.
c. Scissor Trusses - Size plates, nail and steel section, for 160 percent of member forces.
d. No increase in plate values will be allowed for duration of loading or other factor.
5. Press plates into members to obtain full penetration without crushing outer surface of wood. Plate embedment is acceptable if opening between plate and wood surface is less than 1/32 inch.
6. Lumber defects and plate misplacement, in combination, shall not reduce plate area or number of effective teeth, prongs, or nails by more than ten percent.
7. Do not apply metal gusset plates after shop fabrication.

2.3 SOURCE QUALITY CONTROL

A. Inspections
1. Notify Architect seven days prior to beginning truss fabrication to allow scheduling of Architect's inspection visit during truss fabrication.

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 06 201

GENERAL FINISH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install sealants required for items installed under this Section, as described in Contract Documents.
   2. Furnish and install following items as described in Contract Documents -
      a. Casework.
      b. Wood Trim.

B. Products Installed But Not Supplied Under This Section
   1. Finish Hardware
   2. Miscellaneous as specified elsewhere

C. Related Sections
   1. Division 07 - Quality of sealants, submittal and installation requirements
   2. Division 08 - Furnishing of Finish Hardware

PART 2 PRODUCTS

2.1 MATERIALS

A. Glue - Waterproof and of best quality.

B. Decoration Anchors - Bright zinc plated, wire size 4, 3-7/8 inches total length.

PART 3 EXECUTION

3.1 INSTALLATION

A. General Woodwork
   1. Work shall be made in accordance with measurements taken on the job.
   2. Scribe, miter, and join accurately and neatly to conform to details.
   3. Exposed surfaces shall be machine sanded, ready for finishing.
   4. Countersink nails. Countersink screws and plug those exposed to view.

B. Items installed but not supplied under this Section - Install in accordance with requirements specified in Section supplying item.

END OF SECTION

SECTION 06 205

MISCELLANEOUS TRIM & MOLDING

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install wood trim not specified elsewhere as described in Contract Documents.

B. Related Sections
   1. Section 06 201 - General Finish Carpentry
   2. Section 06 450 - Standing and running trim.

PART 2 PRODUCTS

2.1 MATERIALS

A. Softwood - Solid stock Pine, C or better, S4S.

B. Hardwood - Plain sawn Cherry or Oak.

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 06206

EXTERIOR WOOD SOFFITS & FASCIA

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install soffits, fascia, and paneling as described in Contract Documents.

B. Related Sections
   1. Section 06201 - General Finish Carpentry Requirements
   2. Division 07 - Metal soffits and fascia

PART 2 PRODUCTS

2.1 MATERIALS

A. Soffits & Fascias
   1. Fascias - D & better Ponderosa Pine, Cedar, or Cypress, S4S, K-D
   2. Soffits - A-C Exterior DFPA Grade marked plywood.
   3. Nails - Galvanized or aluminum, casing type.
   4. Back Priming - Cuprinol #20 Wood Preservative or Thompson's Water Seal.

PART 3 EXECUTION

3.1 INSTALLATION

A. Soffits & Fascias
   1. Soffits -
      a. Nail edges 4 inches on center and intermediate members 8 inches on center.
      b. Set exposed nail heads to receive putty.
   2. Fascia -
      a. Miter boards and trim.
      b. Rigidly secure, nail as necessary.
      c. Use care to prevent hammer head or nail set markings.
      d. Secure fascia in straight, true, level line without buckles, sags, splittings, ragged edges, tool, marks, or other defects.
      e. Set exposed nail heads 1/8 inch to receive putty.
      f. Back prime fascia.

B. Paneling - Follow Manufacturer's recommendations.

END OF SECTION

SECTION 06 210

DOOR & FRAME INSTALLATION

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install sealants for calking door frames as described in Contract Documents.

B. Products Installed But Not Supplied Under This Section
   1. Flush wood doors
   2. Hollow metal door frames

C. Related Sections
   1. Section 06 201 - General Finish Carpentry
   2. Division 07 - Quality of sealants
   3. Division 08 - Furnishing of doors and frames

1.2 SUBMITTALS

A. Quality Assurance Submittals
   1. Submit copy of "Installation Guide for Doors & Hardware" by Door & Hardware Institute for Architect's examination. Guide may be obtained from Door and Hardware Institute (DHI).

1.3 QUALITY ASSURANCE

A. Regulatory Requirements
   1. Fire door installations shall meet code requirements.

1.4 DELIVERY, STORAGE, & HANDLING

A. Wood Doors
   1. Do not have doors delivered to building site until after plaster, cement, and taping compound are dry. If doors are to be stored at job-site for more than one week, seal top and bottom edges.
   2. Store flat on a level surface in a dry, well ventilated building. Cover to keep clean but allow air circulation.
   3. Handle with clean gloves and do not drag doors across one another or across other surfaces.
   4. Do not subject doors to abnormal heat, dryness, or humidity or sudden changes therein. Condition doors to average prevailing humidity of locality before hanging.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 INSTALLATION

A. Doors
   1. General -
      a. When Project is completed, doors shall not bind, stick, or be mounted so as to cause future hardware difficulties.
      b. Do not impair utility or structural strength of door in fitting of door, applying hardware, or cutting and altering door louvers, panels, or other special details.

c. Read Hardware Manufacturer's instructions prior to mounting hardware and follow as closely as possible.
d. Mount closers on stop side of door (Parallel Arm) where possible.

2. Wood Doors -
   a. Use hardware templates furnished by Hardware Manufacturer when mounting hardware.
   b. Set hinges flush with edge surface. Be sure that hinges are set in a straight line to prevent distortion.
   c. Mount door latches high in strike plate opening so when door later settles, latch will not bind.

B. Hollow Metal Frames
1. Site Tolerances -
   a. Squareness - 1/16 inch from top edge to opposite top edge.
   b. Plumbness - 1/16 inch from top of jamb to bottom of jamb.
   c. Alignment - 1/16 inch from plane of left side face of jamb to right side face of jamb.
   d. Twist - 1/16 inch across throat of jamb plane measured across each face to plane of opposite jamb throat.
   e. Finished Clearance Between Door & Frame -
      1) 1/16 inch at head and hinge jamb plus 1/16 maximum
      2) 1/8 inch at strike jamb plus or minus 1/16 inch maximum.
      3) 1/2 inch to top of finished floor surface or 1/4 inch to top of threshold, plus or minus 1/16 inch maximum.
2. Coat interior of frames to be installed in framed walls with spray urethane foam. Trim excess before installation.
3. Set frame in location and level head.
4. Equalize with adjustable floor anchor.
5. Set spreaders and fasten jambs to floor and wall.
   a. Wood spreaders shall be square, fabricated from lumber one inch minimum thick, be same length as door opening at header, and same depth as frame depth.
   b. Cut notches for frame stops.
   c. Do not remove spreaders until frames are permanently anchored in wall.
   d. Use one spreader at base of frame and another at strike level.
   e. Do not use temporary spreaders welded to base of jambs during installation of frame.
6. Install four anchors minimum per jamb. Locate anchors at centerline of hinges and at base of jamb.
7. Fill gap between frame and framing with urethane foam or fiberglass insulation. Calk around both sides of frame with specified sealant.

END OF SECTION

SECTION 06401

GENERAL ARCHITECTURAL WOODWORK REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Standards for fabrication of Architectural Woodwork and for hardware associated with Architectural Woodwork.

B. Products Supplied But Not Installed Under This Section
   1. Architectural Woodwork

C. Related Sections
   1. Section 06110 - Furring and blocking
   2. Division 09 - Filling of nail holes and finishing

1.2 SUBMITTALS

A. Product Data - Manufacturer's literature for specialty items and hardware not manufactured by Architectural Woodwork firm.

B. Samples - Samples of wood specie which is to receive transparent finish, if requested by Architect.

1.3 DELIVERY, HANDLING, & STORAGE

A. Assemble work at mill and deliver ready for erection insofar as possible.

B. Protect architectural woodwork from moisture and damage while in transit to job site. Unload and store in place where it will be protected from moisture and damage and convenient to use.

PART 2 PRODUCTS

2.1 MATERIALS

A. Lumber
   1. Grade -
      a. No defects in boards smaller than 600 sq in.
      b. One defect per additional 150 sq inches in larger boards.
      c. Select pieces for uniformity of grain and color on exposed faces and edges.
      d. No mineral grains accepted.
   2. Allowable Defects -
      a. Tight knots not exceeding 1/8 inch in diameter. No loose knots permitted.
      b. Patches (dutchmen) not apparent after finishing when viewed beyond 18 inches.
      c. Checks or splits not exceeding 1/32" x 3" and not visible after finishing when viewed beyond 18 inches.
      d. Stains, pitch pockets, streaks, worm holes, and other defects not mentioned are not permitted.
      e. Normal grain variations, such as cats eye, bird's eye, burl, curl, and cross grain are not considered defects.
   3. Use maximum lengths possible, but not required to exceed 10 feet without joints. No joints closer than 6 feet in straight run.
   4. Moisture content shall be 6% maximum at fabrication. No opening of joints due to shrinkage is acceptable.

B. Panel Products
   1. Core shall be medium density fiberboard with minimum weight of 37 lbs/cu ft.
   2. Facings -
      a. Hardwood veneer shall be plain sliced AWI Grade AA, HPVA Grade AA, NWWDA premium Grade, or APA Grade A.
      b. Melamine or Kortron.
   3. Edgings -
      a. Exposed and semi-exposed edges of panel product with one or both faces having hardwood veneer shall have 3/4 inch by 1/4 inch edge-band of wood species matching hardwood face veneer.
      b. Exposed and semi-exposed edges of panel product with both faces Melamine or Kortron shall have PVC 'T' molding.
   4. Glues used in manufacture of panel products shall be Type I or II.
   5. Moisture content shall be same as specified for lumber.

2.2 FABRICATION

A. Fabricate work in accordance with measurements taken on job site.

B. 'Ease' sharp corners of exposed members to promote finishing and protect users from slivers.

C. Fabricate so veneer grain is vertical.

D. Joints
   1. Join members by pressure glue and biscuit joints, or pressure glue and dowels.
   2. Use lumber pieces with similar grain pattern when joining end to end.
   3. Compatibility of grain and color from lumber to panel products is required.

E. Finish Tolerances
   1. No planer marks (KCPI) allowed. Sand all wood members and surfaces to 100 grit.
   2. Maximum Gap - None allowed.
   3. Flushness Variation - 0.015 inch maximum.
   4. Sanding Cross Scratches - 0.250 inch maximum
   5. Plug screw holes. Screw locations not to be visible beyond 18 inches.

F. Install hardware in accordance with Manufacturer's directions. Leave operating hardware operating smoothly and quietly.

G. Remove or repair damaged surface of or defects in exposed finished surfaces of architectural woodwork to match adjacent similar undamaged surface.

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 06410

CUSTOM CASEWORK

PART 1 GENERAL

1.1 SUMMARY

A. Products Supplied But Not Installed Under This Section
   1. Custom casework

B. Related Sections
   1. Section 06201 - Installation
   2. Section 06401 - General Architectural Woodwork Requirements
   3. Division 12 - Manufactured Casework

1.2 REFERENCES

A. American National Standards Institute
   1. ANSI A161.2-1979 (R1987), "Performance Standards for Fabricated High Pressure Decorative Laminate Countertops"

B. National Electrical Manufacturer's Association
   1. NEMA LD 3-1991, "High Pressure Decorative Laminates"

1.3 SUBMITTALS

A. Product Data
   1. Manufacturer's literature or cut sheets for -
      a. Plastic laminate
      b. Hardware
      c. Adjustable pulpit mechanism.
   2. Color selections.

PART 2 PRODUCTS

2.1 MATERIALS

A. Wood
   1. Exposed - Plain sawn Red Oak.
   2. Semi-exposed - Species as acceptable for AWI custom grade.

2.2 COMPONENTS

A. Casework Doors
   1. Doors 1-3/8 inch or more thick shall be hollow core.
   2. Doors under 1-3/8 inch thick shall be solid core.

B. Hardware
   1. Cabinet & Drawer Pulls -
      a. US26D steel bow handles, 4 inches long minimum.
      b. Quality Standard - 116.07.471 by Hafele, Archdale, NC (919) 889-2322
   2. Cabinet Adjustable Shelf Supports -
      a. 32mm System -
         1) Vinyl coated steel, pin size 4.7 mm x 5/16"
         2) Quality Standard - 348 by Knape & Vogt, Grand Rapids, MI (800) 253-1561
      b. Standard -
         1) Quality Standard - 255 & 256 by Knape & Vogt, Grand Rapids, MI (800)

253-1561

3. Cabinet Hinges -
   a. Use number of hinges per leaf as recommended by Manuafcturer.
   b. Doors 4 Feet High or Less - European style, self-closing, 120 degree opening minimum.
   c. Doors Over 4 Feet High -
      1) TB 2714 by Mckinney, Scranton, PA (717) 346-7551
      2) FBB 179 by Stanley, New Britain, CT (800) 622-4393
      3) BB 1279 by Hager, St Louis, MO (314) 772-4400
      4) BB 5000 by Bommer, Landrum, SC (803) 457-3301
4. Drawer Guides -
   a. Full extension, steel ball bearings. 100 lb load rating for standard and pencil drawers, 150 for lateral file.
   b. Approved Manufacturer -
      1) Pencil Drawers - 2006 by Accuride, Santa Fe Springs, CA (310) 903-0226
      2) Standard Drawers - 3832 by Accuride
      3) Lateral Files -
         a) 30 Inch Wide Drawer & Under - 4034 by Accuride
         b) Over 30 Inch Wide Drawer - 3640 by Accuride
6. Cabinet Surface Bolts (inactive leaf) -
   a. Quality Standard - 043-2" by Ives, New Haven, CT (203) 772-0310
7. Cabinet & Drawer Locks -
   a. Pin tumbler type suitable for location. Key individually by cabinet grouping shown on signage schedule. Stamp keys with Room number and cabinet designation.
   b. Approved Manufacturers -
      a. Chicago
      b. Corbin Russwin
      c. National
      d. Or as approved by SUU Facilities Management

2.3 FABRICATION

A. Cabinet Component Thickness & Material
   1. Use hardwood veneer facing except -
      a. Cabinet interiors and shelving faces behind cabinet doors.
      b. Cabinet interiors and shelving faces, exposed to sight and behind cabinet doors.
   2. Ends, Divisions, Bottoms, Tops - 3/4 inch panel product.
   3. Rails - 3/4 inch panel product.
   4. Shelves - Edge-banded panel product, 3/4 inch thick for spans up to 36 inches and one inch thick for spans 36 to 48 inches. Provide Hafele or equal center supports for spans over 48 inches.
   5. Backs - 1/4 inch nominal panel product.
   6. Doors - 3/4 inch panel product.
   7. Drawer Sides, Backs, & Subfronts - 1/2 inch panel product.
   8. Drawer Bottoms - 1/4 inch nominal panel product.
   9. Drawer Front - 3/4 inch panel product.
   10. Hardboard Dividers - 1/8 inch thick, smooth both sides. Color to match cabinet interior.
   11. Hardboard Shelves - 1/4 inch thick, smooth both sides. Color to match cabinet interior.

B. Drawers to have guides.

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 06 450

STANDING & RUNNING TRIM

PART 1 GENERAL

1.1 SUMMARY

A. Products Supplied But Not Installed Under This Section
   1. Hardwood trim at light coves and windows.

B. Related Sections
   1. Section 06 201 - Installation

PART 2 PRODUCTS

2.1 MATERIALS

A. Interior Wood For Transparent Finish
   1. Solid wood shall be plain sawn Cherry.
   2. Stain per finish schedule.

PART 3 EXECUTION

3.1 INSTALLATION

A. Trim
   1. Install per standard practice.

END OF SECTION

SECTION 07155

BUILDING PAPER

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install building paper not specifically specified elsewhere.

B. Related Sections
   1. Section 07300 - Roofing felts
   2. Section 07500 - Roofing felts

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM D 226-88, "Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing"

PART 2 PRODUCTS

2.1 MATERIAL

A. Building Paper - No. 15 asphalt saturated felt meeting requirements of ASTM D 226.

PART 3 EXECUTION

3.1 INSTALLATION

A. As weather protection, apply shingle fashion lapped 2 inches minimum at horizontal joints and 6 inches minimum at vertical joints.

END OF SECTION

SECTION 07192

LAMINATED VAPOR RETARDERS

PART 1 GENERAL Master - 07192

1.1 SUMMARY

A. Products Supplied But Not Installed Under This Section
   1. Laminated vapor retarders and seam tape for installation under interior slabs-on-grade.

B. Related Sections
   1. Division 02 - Installation

1.2 REFERENCES

A. American Society for Testing and Materials
   1. ASTM D 882-91, "Standard Test Methods for Tensile Properties of Thin Plastic Sheeting"
   2. ASTM D 1709-85, "Test Method for Impact Resistance of Polyethylene Film by the Free Falling Dart Method"
   3. ASTM D 4833-88, "Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products"
   4. ASTM E 96-92, "Standard Test Methods for Water Vapor Transmission of Materials"
   5. ASTM E 154-88, "Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover"

1.3 SUBMITTALS

A. See Section 01300.

B. Quality Control/Assurance - Manufacturer's data relating to ASTM Standards.

PART 2 PRODUCTS

2.1 MATERIALS

A. Laminated Vapor Retarder
   1. Performance minimums -
      a. Thickness - 30 mils
      b. Tensile Strength, 3 inch, when tested in accordance with ASTM D 882 - MD 200
      c. Dart Impact Strength when tested in accordance with ASTM D 1709 - 3000 gms
      d. Puncture Resistance when tested in accordance with ASTM D 4833 - 70 lbs
      e. Perm Rating - .1 perms
   2. Approved Product - Griffolyn T-65G

2.2 ACCESSORIES

A. Seam Tape - Griffolyn Fab Tape double sided asphalt base pressure sensitive tape by Reef Industries.

B. Penetration Boots at Utility Penetrations - Factory fabricated of Griffolyn T-65 Membrane

2.3 APPROVED MANUFACTURER

A. Reef Industries, Houston, TX (800) 231-6074.

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 07193

POLYETHYLENE FILM VAPOR RETARDERS

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install polyethylene film vapor retarders on framed walls and ceilings as described in Contract Documents.

1.2 REFERENCES

A. American Society for Testing and Materials
   1. ASTM D 4397-91, "Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications"

1.3 SUBMITTALS

A. Samples - Submit samples of lap sealant or seam tape, and cardboard reinforcement prior to beginning work of this Section.

PART 2 PRODUCTS

2.1 MATERIALS

A. Vapor Retarder - 6 mil minimum clear polyethylene sheets meeting requirements of ASTM D 4397.

2.2 ACCESSORIES

A Lap Sealant
   1. "Narrow Joint Sealer" by Schnee-Morehead Inc, Irving, TX (214) 438-9111
   2. Equal as approved by Architect before bidding. See Section 01600.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install using 1/2 inch long minimum staples through thin cardboard disc or strip reinforcement. Staple every 6 inches along structural members and blocking and 3 inches in from sheet edge. Run long edge of sheet along structural members.

B. Bed joints in specified sealant or seal with vapor resistant tape of type recommended by Manufacturer for vapor retarder installation.

C. Seal penetrations through vapor retarder immediately prior to installation of gypsum board.

3.2 FIELD QUALITY CONTROL

A. Inspection
   1. Vapor retarder is to be air tight and free from holes, tears, and punctures.
      a. Immediately prior to installation of gypsum board, inspect vapor retarder for holes, tears, and punctures and repair damaged areas.
      B .Immediately prior to completion of Project, inspect exposed vapor retarder for holes, tears, and punctures and repair damaged areas.

END OF SECTION

SECTION 07211

UN-FACED BATT & BLANKET INSULATION

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install batt insulation in existing ceiling as described in Contract Documents.

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM C 665, "Specification for Mineral-Fiber Thermal Insulation For Light Frame Construction and Manufactured Housing"

PART 2 PRODUCTS

2.1 MATERIALS

A. Insulation
   1. "Friction-Fit" unfaced batts, either 16 or 24 inches wide according to framing spacing.
   2. Order insulation by "R" factor rather than "U" factor, rating, or thickness and in accordance with ASTM C 665, Type I.
   3. "R" Factor - 19
   4. Approved Manufacturers
      a. Certainteed Corp, Valley Forge, PA (800) 523-7844
      b. Knauf Fiber Glass, Shelbyville, IN (317) 398-4434
      c. Owens-Corning Fiberglass Corporation, Toledo, OH (800) 832-3585
      d. U S Gypsum "Thermafiber", Chicago, IL (312) 606-4000
      e. Western Fiberglass, Inc, Salt Lake City, UT (801) 972-1223
      f. Equal as approved by Architect before bidding. See Section 01600.

2.2 SOURCE QUALITY CONTROL

A. Insulation shall be manufactured to be in compliance with IBC.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with Manufacturer's directions, in compliance with IBC, and as follows
   1. Leave no gaps in insulation envelope.
   2. Install insulation between framing, behind plumbing & wiring, and in similar places.
   3. Fit ends of batts snug against plates.
   4. Do not cover recessed light fixtures with insulation. Cut out insulation to provide 6 inch minimum clearance around recessed lighting fixtures.

END OF SECTION

SECTION 07212

FACED BATT & BLANKET INSULATION

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install thermal and acoustic batt insulation as described in Contract Documents.

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM C 665, "Specification for Mineral-Fiber Thermal Insulation For Light Frame Construction and Manufactured Housing"

PART 2 PRODUCTS

2.1 MATERIALS

A. Insulation
   1. Kraft faced meeting requirements of ASTM C 665, Type II, Class C.
   2. Foil faced meeting requirements of ASTM C 665, Type III, Class B.
   3. Order insulation by "R" factor rather than "U" factor, rating, or thickness, either 16" or 24" wide according to framing spacing.
   4. "R" Factor Required -
      a. Nominal Wood or Metal Framing
         1) 2x4 - 11
         2) 2x6 - 19
   5. Approved Manufacturers -
      a. Certainteed Corp, Valley Forge, PA (800) 523-7844
      b. Knauf Fiber Glass, Shelbyville, IN (317) 398-4434
      c. Owens-Corning Fiberglass Corporation, Toledo, OH (800) 832-3585
      d. U S Gypsum "Thermafiber", Chicago, IL (312) 606-4000
      e. Western Fiberglass, Inc, Salt Lake City, UT (801) 972-1223
      f. Equal as approved by Architect prior to bidding. See Section 01 600.

2.2 SOURCE QUALITY CONTROL

A. Insulation shall be manufactured to be in compliance with IBC.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with Manufacturer's directions, in compliance with UBC or other applicable building codes, and as follows
   1. If two layers of insulation are used to attain required "R" factor, only layer towards interior of building shall have facing.
   2. Leave no gaps in insulation envelope.
   3. Install insulation between jambs & framing, behind plumbing & wiring and in similar places.
   4. Fit ends of batts snug against top and bottom plates.
   5. Where insulation is not enclosed by structure or drywall, support in place with wire or other suitable material and use only foil faced insulation.

6. Install baffles between structure at ventilation spaces if necessary to prevent insulation from blocking air flow from soffit.
7. Do not cover recessed light fixtures with insulation. Cut out insulation to provide a minimum of 6 inch clearance around recessed lighting fixtures.

END OF SECTION

SECTION 07312

FIBERGLASS SHINGLES

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install roofing system as described in Contract Documents.

B. Products Installed But Not Supplied Under This Section
   1. Sheet metal work including valleys, drip edges, pipe jacks, etc.

C. Related Sections
   1. Section 07472 - Drip Edge
   2. Section 07634 - Roof flashing

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM D 226-89, "Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing"
   2. ASTM D 3018-90, "Standard Specification for Class "A" Asphalt Shingles Surfaced with Mineral Granules"
   3. ASTM D 3462-87, "Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules"
   4. ASTM D 4586-93, "Standard Specification for Asphalt Roof Cement, Asbestos-Free"

1.3 SYSTEM DESCRIPTION

A. Design Requirements - This specification sets minimum standards for materials and workmanship. Manufacturer's bonding requirements or governing building codes shall apply where they impose higher standards.

1.4 SUBMITTALS

A. See Section 01300.

B. Product Data
   1. Manufacturer's literature or cut sheet for each component of system
   2. Color and style selection
   3. Copy of specified warranties

C. Samples - Submit full size sample of shingle.

1.5 QUALITY ASSURANCE

A. Field Sample
   1. Before application of complete roofing system, install portions of single valley sufficient to show proper installation and material for following elements -
      a. Valley flashing
      b. Valley metal and clips
      c. Primary underlayment, fasteners, and laps
      d. Secondary underlayment and laps
      e. Shingles and fasteners

B. Pre-Installation Meeting

1. See Section 01200.
2. Schedule meeting during installation of or immediately after completion of field sample.

1.6 PROJECT/SITE CONDITIONS

A. Environmental Requirements
1. When temperature at installation will be 45 deg F or less, store shingles at 70 deg F minimum for 72 hours minimum. Do not take more shingles to site than can be installed during same working day unless provisions to maintain 60 deg F minimum storage temperature are provided.
2. In addition to above requirements, do not install shingles at lower temperatures than allowed by Manufacturer for application.

1.7 WARRANTY

A. Shingle Manufacturer's 30 year minimum labor and material warranty. Warranty will provide for full replacement cost including tear-off and disposal for first 5 years with 25 years pro-rated replacement cost including tear-off and disposal thereafter. Warranty shall include -
1. Roofing system will resist blow-offs in winds up to 60 mph for 5 years.
2. Manufacturing defects for 5 years.
3. Fungus-algae resistance for 15 years, if required.

B. In addition to Manufacturer's warranty, General Contractor shall furnish written two year guarantee covering repairs and replacements for any defect or failure due to faulty workmanship at no additional cost to Owner.

1.8 MAINTENANCE

A. Extra Materials - Provide three bundles of shingles for Owner's future use.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Shingles
1. Fiberglass matt shingles meeting or exceed requirements of ASTM D 3018, Type I, ASTM D 3462, and following requirements -
a. Minimum manufactured weight -
1) Standard Shingles - 300 lbs per square minimum
2) Starter Strip Shingles - 200 lbs per square and of style offering 20 year warranty.
b. Hip and ridge shingles shall be Factory Pre-Formed.
c. UL Class A.
2. Color as selected by Architect from Manufacturer's full color line.
3. Approved Types & Manufacturers -
a. "Prestique I" 300# by Elk Roofing Products, Dallas, TX (800) 879-4355
b "Timberline" 300# by GAF Corp, Wayne, NJ (800) 622-4423
c. "Architect 80" by GS Roofing Products Co Inc, Irving, TX (800) 666-7005
d. "Oakridge" by Owens-Corning Fiberglas Corp, Toledo, OH (800) 832-3585
e. "Heritage 30" 300# by Tamko, Joplin, MO (417) 624-6644

B. Underlayment
1. Primary - 30 lb felt meeting requirements of ASTM D 226, Type II.
2. Secondary -
a. Single-layer of 36 mil rubberized asphalt on 4 mil polyethylene carrier sheet.
b. Approved Products & Manufacturers -
1) Ice & Water Shield by W. R. Grace, Cambridge, MA (800) 521-2737

2) Polyken 640 Ice-O-Late by The Kendall Co, Boston, MA (617) 423-2000
3) Aquasel WIP by Mirafi Inc, Charlotte, NC (800) 234-0484
4) F-610 by NEI, Brentwood, NH (800) 998-4634
5) Nordshield by Nord Bitumi, Macon, GA (912) 781-9293
5) Deck Guard by Polyguard Products Inc, Ennis, TX (214) 875-8421
6) Moisture-Guard by Tamko, Joplin, MO (417) 624-6644

C. Fasteners
1. Primary Underlayment -
a. Roofing nails with one inch diameter head and 3/4 inch long shank minimum.
1) If shingles applied as underlayment is laid, use metal or plastic head Simplex nails or one inch long shingle roofing nails.
2) If shingles not applied as underlayment is laid, use plastic head only.
b. Approved Manufacturers -
1) Plasti-Top Felt Nail by National Nail Corp, Grand Rapids, MI (800) 253-7774
2) ButtonKap by Carolina Nail Inc, Rural Hall, NC
3) Equal as approved by Architect prior to bidding. See Section 01 600.
2. Shingles -
a. Ten gauge barb shanked hot-dipped galvanized roofing nails with 3/8 inch nominal diameter head.
1) Field - 1-1/2 inch long minimum
2) Ridge - 2 inch long minimum
3) Use longer nails where additional roofing material is used or if required by Manufacturer.
b. Coil type non-corrosive gun-driven nails of same size as hand-driven nails are acceptable.
c. Staples not permitted.

D. Asphalt Plastic Cement - Any manufacturer's product meeting requirements of ASTM D 4586 and acceptable to Shingle Manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not install underlayment over roof sheathing that exceeds 19 percent moisture content. Conduct moisture test if requested by Architect.

3.2 PREPARATION

A. Clean roof sheathing, including removal of dirt and debris, prior to installation of underlayment.

3.3 INSTALLATION

A. Underlayment
1. Do not use permanent underlayment installation as temporary roof. If temporary roof is used, remove completely prior to installation of permanent underlayment.
2. Secondary -
a. Lap end joints 6 inches and side joints 3 inches.
b. Apply continuous 36 inch wide sheet in valley centered over valley flashing.
c. Apply two 36 inch wide sheets along eaves and rakes as described in Contract Documents.
d. Do not leave exposed to weather more than 15 days after beginning of installation.
3. Primary -

a. Apply 36 inch wide sheets over complete deck, including area covered with secondary underlayment. Maintain end laps of 8 inches and side laps of 19 inches.
b. Do not leave exposed to weather more than 14 days after beginning of underlayment installation.
c. Nailing -
1) If shingles are applied as underlayment is laid, secure underlayment to deck with roofing nails one inch in from edge and 18 inches on center.
2) If shingles not applied as underlayment is laid, spot mop in field and continuously seal at lower edge and end laps with asphalt plastic cement. Nail 6 inches on center along bottom edge and ends, and 18 inches on center every 12 inches up from bottom edge. It is not necessary to nail top edge except at ridge of roof.

B. Shingles
1. Prior to installing shingles, inspect underlayment and metal installation with Architect and Owner. Correct improperly installed and damaged material prior to beginning shingle installation.
2. Cut starter strip shingles on slotted end to 9 inch width. Nail to eave granule side up in continuous mastic bed with slot end up-slope and edge overhanging eave 3/8 inch. Install shingles with 5-1/2 inch nominal maximum exposure unless Manufacturer recommends less. Lay first course directly over starter strip with ends flush with starter strip at eaves and so joints in starter strip do not coincide with joints in first course.
3. Insure alignment by running vertical line down center of roof and laying shingles from center to rake and, in addition, snapping chalk line at least each fifth course to control horizontal alignment.
4. Lay shingles so end joints are offset in accordance with Manufacturer's installation procedures.
5. Except over valley metal, use six nails in each shingle placed on line 5/8 inch under bottom edge of next line of shingles. Place nail one inch from each end of strip and balance evenly spaced between. Should any nail fail to penetrate solid decking, drive additional nail nearby. Adjust nail gun pressure for nailing flush and tight to deck without cutting shingle surface. Drive nails perpendicular to shingle surface so nail head is flat against shingle.
6. Use factory supplied ridge shingles. Apply with 5 inch exposure, blind nailed, and tabbed with asphalt plastic cement. Run ridge shingles as directed by Architect.
7. Vent pipe sleeve flange minimum width 6 inches. Fit shingles under lower edge and over sides and upper edge. Set vent pipe flange in asphalt plastic cement. Embed shingles in asphalt plastic cement where they overlap flange. Apply bead of asphalt plastic cement at junction of vent pipe and vent flashing.
8. Run courses true to line with end joints properly placed. Leave shingles flat without wave and properly placed.
9. Hand-Tabbing -
a. If ambient temperature or exposure to sun will not be sufficient to secure adhesive strip to under-lying shingle within one week, hand tab shingles with asphalt plastic cement.
b. In areas of high wind, as determined by Architect prior to bid, apply 4 dime-sized dabs of asphalt plastic cement to back of shingle tab. Press shingles firmly into cement.

3.4 CLEANING

A. Clean shingles and building of soiling caused by this installation.

B. Leave metals clean and free of defects, stains, and damaged finish.

C. Remove debris resulting from work of this Section from roof and site.

END OF SECTION

SECTION 07 471

METAL SOFFITS

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install metal soffit as described in Contract Documents.

B. Related Sections
   1. Section 07 920 - Quality of sealants and submittal and installation requirements.

1.2 SUBMITTALS

A. See Section 01 300.

B. Quality Assurance/Control
   1. Provide Manufacturer's written installation instructions.

1.3 WARRANTY

A. Manufacturer's written 20 year guarantee for finish.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Aluminum Soffits
   1. Panels -
      a. 0.032 inch thick minimum, flush panel design 6 inches wide.
      b. Panels shall be interlocked full length of panel.
   2. Finish -
      a. Polyvinyledene Fluoride (PVF_2) Resin-base (Kynar 500 or Hylar 5000) finish for coil coating components containing 70% minimum PVF_2 in resin portion of formula. Thermo cured two coat system consisting of corrosion inhibiting epoxy or acrylic latex primer and top coat factory applied over properly pretreated metal.
      b. Color as selected by Architect from Manufacturer's standard colors.
   3. Approved Manufacturers -
      a. AEP/Span, San Diego, CA
      b. Alumax Building Specialties Div, Mesquite, TX
      c. Atas Aluminum Products, Allentown, PA
      d. Copper Sales Inc, Minneapolis, MN
      e. Fashion Inc, Lenaxa, KS
      f. MM Systems Corp, Tucker, GA
      g. Peterson Aluminum Corp, Elk Grove, IL
      h. Reynolds Metals Company, Richmond, VA
      i. Vincent Metals, Minneapolis, MN

B. Continuous Soffit Vent
   1. Approved Manufacturers -
      a. Vent-A-Strip by Alcoa Building Products, Sydney, OH
      b. Soffit Louver Strips by Ampcor, Taylorsville, MS
      c. Equal as approved by Architect prior to bidding. See Section 01 630.

C. Fastening Devices - One inch aluminum screws or 1-1/2 inch ring shanked nails.

PART 3 EXECUTION

3.1 INSTALLATION

A. Conceal fasteners where possible. Paint heads of exposed fasteners to match background.

B. Isolate from dissimilar metals to prevent electrolytic action.

C. Calk joints with specified sealant.

D. Repair buckling or bowing due to improper installation at no additional cost to Owner.

END OF SECTION

SECTION 07472

METAL FASCIA

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install metal fascia as described in Contract Documents.

B. Product Supplied But Not Installed Under This Section
   1. Drip edge

C. Related Sections
   1. Section 07 300 - Installation of drip edge

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM A 361-85 (1990), "Specification for Steel Sheet, Zinc-Coated (Galvanized) by Hot-Dip Process for Roofing and Siding"

1.3 WARRANTY

A. Manufacturer's written 20 year guarantee for finish.

PART 2 PRODUCTS

2.1 MATERIALS

A. Fascia and drip edge shall be of same material.

B. Fascia
   1. Aluminum -
      a. 0.032 inch thick minimum aluminum complete with accessories recommended by Manufacturer for proper installation.
      b. Fastening Devices - One inch zinc or cadmium plated screws.
   2. Steel -
      a. Minimum 24 ga steel, hot-dipped galvanized to meet requirements of ASTM A 361, 1.25 oz/sq ft and complete with accessories recommended by Manufacturer for proper installation.
      b. Fastening Devices - Galvanized steel screws.
   3. Finishes -
      a. Aluminum & Steel - Face coating polyvinyledene Fluoride (PVF_2) Resin-base finish (Kynar 500 or Hylar 5000) for coil coating components containing 70 percent minimum PVF_2 in resin portion of formula. Thermo cured two coat system consisting of corrosion inhibiting epoxy or acrylic latex primer and top coat factory applied over properly pretreated metal.
      b. Steel - Reverse side coating thermo cured system consisting of corrosion inhibiting epoxy or acrylic latex primer applied over properly pretreated metal.
      c. Color as selected by Architect from Manufacturer's standard colors.
   4. Approved Manufacturers -
      a. AEP/Span, Dallas, TX or San Diego, CA
      b. Atas Aluminum Products, Allentown, PA
      c. Copper Sales Inc, Minneapolis, MN
      d. Engineered Components Inc, Stafford (Houston), TX

e. Alumax Building Specialties, Mesquite, TX
f. MM Systems Corp, Tucker, GA
g. Merchant & Evans Industries Inc, Burlington, NJ
h. Peterson Aluminum Corp, Elk Grove, IL
i. Reynolds Metals Company, Richmond, VA
j. Vincent Metals, Minneapolis, MN

C. Continuous Soffit Vent
1. Approved Manufacturers -
a. Vent-A-Strip by Alcoa Building Products, Sydney, OH
b. Soffit Louver Strips by Ampcor, Taylorsville, MS
c. Equal as approved by Architect prior to bidding. See Section 01600.

2.4 FABRICATION

A. Fascia may either be shop-fabricated using metal from a specified manufacturers, or a factory-fabricated standard system from a specified manufacturer.

PART 3 EXECUTION

3.1 INSTALLATION

A. Conceal fasteners except where details might require a minimum number to be exposed. Paint heads of exposed fasteners to match background.

B. Install with slip joints at each end. Screw to substrate through pre-drilled, over-size holes.

C. Isolate from dissimilar metals not part of fascia system to prevent electrolytic action.

D. Repair buckling or bowing due to improper installation at no cost to Owner.

END OF SECTION

SECTION 07622

ALUMINUM FLASHING & COUNTERFLASHING

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install aluminum flashing, counterflashing, and hold-down clips as described in Contract Documents.

PART 2 PRODUCTS

2.1 MATERIALS

A. Sheet Aluminum
   1. 3105-H25 alloy
      a. Flashing & Counterflashing - 0.040 inch thick minimum
      b. Hold-Down Clips - 0.050 inch thick minimum
   2. Finish -
      a. Unexposed - Mill finish.
      b. Exposed To View -
         1) Face coating of polyvinyledene Fluoride (PVF_2) Resin-base finish (Kynar 500 or Hylar 5000) containing 70 percent minimum PVF_2 in resin portion of formula. Thermo cured two coat system consisting of corrosion inhibiting epoxy or acrylic latex primer and top coat factory applied over properly pretreated metal.
         2) Color as selected by Architect from Manufacturer's standard colors.

B. Screws, Bolts, Nails, & Accessory Fasteners - Of strength and type consistent with function.

2.2 FABRICATION

A. Form accurately to details.

B. Profiles, bends, and intersections shall be even and true to line.

C. Fold exposed edges 1/2 inch to provide stiffness.

PART 3 EXECUTION

3.1 INSTALLATION

A. Slope to provide positive drainage.

B. Provide sufficient hold down clips to insure true alignment and security against wind.

C. Install with 4 inch minimum overlap.

D. Bed overlap joints in appropriate sealant specified in Section 07 920.

E. Form and lap step flashings.

F. Allow sufficient tolerance for expansion and contraction.

G. Insulate work to prevent electrolytic action.

3.2 CLEANING

A. Leave metals clean and free of defects, stains, and damaged finish.

END OF SECTION

SECTION 07634

ROOF FLASHING

PART 1 GENERAL

1.1 SUMMARY

A. Products Supplied But Not Installed Under This Section
   1. Pipe flashing

B. Related Sections
   1. Section 07300 - Installation
   2. Section 07472 - Drip edge
   3. Section 07920 - Quality of sealants
   4. Division 09 - Painting

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM B 101-83 (1988), "Standard Specification for Lead-Coated Copper Sheets"
   2. ASTM A 361-85 (1990), "Specification for Steel Sheet, Zinc-Coated (Galvanized) by Hot-Dip Process for Roofing and Siding"

1.3 SUBMITTALS

A. See Section 01300.

B. Sample - Submit 12 inch square sample of valley metal with product data.

PART 2 PRODUCTS

2.1 MATERIALS

A. Pipe Flashing For Plumbing Vent Lines
   1. 16 oz sheet copper or 4 lb per sq ft lead flashing.
   2. Flashing base shall be at least 24 inches square.

B. Roof Jacks For Flues & Furnace Piping - Factory-made galvanized steel.

2.2 FABRICATION

A. Form accurately to details.

B. Profiles, bends, and intersections shall be even and true to line.

PART 3 EXECUTION

3.1 INSTALLATION

A. Interface With Other Work - Coordinate with pipe installers for proper size of roof jacks and pipe flashing.

B. Pipe Flashing For Plumbing Vent Lines
   1. Copper - Fit snugly around pipes. Calk between copper flashing and pipe with specified sealant.

2. Lead - Fit around pipes and turn down into pipe 1/2 inch with turned edge hammered against pipe wall.

END OF SECTION

SECTION 07636

STEEL GUTTERS & DOWNSPOUTS

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install gutters and downspouts as described in Contract Documents.

B. Related Sections
   1. Section 07920 - Quality of sealants for joints

PART 2 PRODUCTS

2.1 MATERIALS

A. Steel
   1. Downspouts - Rectangular and corrugated, 26 gauge galvanized steel including necessary elbows.
   2. Gutters - 24 gauge galvanized steel.
   3. Finish -
      a. Metal exposed to view shall have face coating of polyvinyledene Fluoride (PVF_2) Resin-base finish (Kynar 500 or Hylar 5000) containing 70 percent minimum PVF_2 in resin portion of formula. Thermo cured two coat system consisting of corrosion inhibiting epoxy or acrylic latex primer and top coat factory applied over properly pretreated metal. Reverse side coating shall be thermo cured system consisting of corrosion inhibiting epoxy or acrylic latex primer applied over properly pretreated metal.
      b. Color as selected by Architect from Manufacturer's standard colors.

B. Screws, Bolts, Nails, & Accessory Fasteners - Of strength and type consistent with function.

C. Downspouts, gutters, hangers, fasteners, and accessories shall be compatible material.

2.2 FABRICATION

A. Size and fabricate in accordance with SMACNA Manual 4th Edition.
   1. Hanger system shall be as detailed in Figure A, Page 41 of SMACNA Manual, 4th Edition.
   2. Cross-sectional configuration of gutter shall be Style G, Page 9 of SMACNA Manual 4th Edition.

B. Form accurately to details.

C. Profiles, bends, and intersections shall be even and true to line.

PART 3 EXECUTION

3.1 PREPARATION

A. Before starting work, verify governing dimensions at building. Inspect for conditions which would prevent installation of first class system. Do not install over improper conditions.

3.2 INSTALLATION

A. Install in accordance with SMACNA Manual Current Edition.

B. Insulate work to prevent electrolytic action.

C. Furnish and install outlet tubes and gutter ends where required. Furnish and install expansion joints in runs exceeding 50 feet and in runs which are restrained at both ends.

D. Lap joints in gutter one inch, apply sealant in lap, and rivet 2 inches on center. Lap joints in downspouts at least 1-1/2 inches in direction of water flow.

3.3 FIELD QUALITY CONTROL

A. At completion of this work, block downspouts and flood gutters. Notify Architect two working days prior to testing. Repair leaks and adjust gradients for proper drainage.

3.4 CLEANING

A. Leave metals clean and free of defects, stains, and damaged finish.

END OF SECTION

SECTION 07725

RIDGE VENTS

PART 1 GENERAL

1.1 SUMMARY

A. Products Supplied But Not Installed Under This Section
   1. Ridge vents

B. Related Sections
   1. Section 07300 - Installation

1.2 SUBMITTALS

A. See Section 01300.

B. Quality Assurance/Control - Submit Manufacturer's design details and installation instructions to Architect.

PART 2 PRODUCTS

2.1 APPROVED MANUFACTURERS

A. Lo-Profile Floating Ridge Vent by Metallic Products Corp, Houston, TX (800) 356-7746
B. Western Metal Products L.C., Woods Cross, UT (801) 298-5880
C. Other shop fabricated or manufactured product approved by Architect before bidding. See Section 01600.

2.2 FABRICATION

A. Fabricated of 26 ga steel or 0.032 in thick aluminum minimum with edges returned or hemmed.

B. Design to include polypropylene vent core.
   1. Approved Manufacturers -
      a. Cor-A-Vent (800) 837-8368
      b. Trimline (800) 438-2920

C. Skirts and ridge cap connected through vent core with painted 1/4" by 1-1/2" Type A corrosion resistant screws with neoprene washers 8 inches on center each skirt.

D. Accessories - End plugs, splice plates, seal tape, straps, fasteners, and other accessories necessary for proper installation.

2.3 FINISHES

A. Exposed Side
   1. Polyvinyledene Fluoride (PV_2) Resin-base finish (Kynar 500 or Hylar 5000) for coil coating components containing 70 percent minimum PVF_2 in resin portion of formula. Thermo cured two coat system consisting of corrosion inhibiting epoxy or acrylic latex primer and top coat factory applied over properly pretreated metal.
   2. Color as selected by Architect from Manufacturer's standard colors.

B. Reverse Side
   1. Coating shall pass requirements of paragraphs 1.1 through 1.4 of Test Method #6.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with Manufacturer's installation instructions as approved by Architect and as follows
   1. Install assembled ridge vent over shingles in bed of asphalt plastic cement with painted 1/4 inch by one inch Type A corrosion resistant screws with neoprene washers 8 inches on center each side of vent.
   2. Join ridge vent units with screws, neoprene washers, splice plates, and tape sealant.

END OF SECTION

SECTION 07920

SEALANTS & CALKING

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Quality of sealants to be used on Project not specified elsewhere, including submittal, material, and installation requirements.

1.2 SUBMITTALS

A. Product Data
   1. Manufacturer's literature and installation recommendations for each Product.
   2. Schedule showing joints requiring sealants with backing and primer to be used.

B. Quality Assurance/Control - Furnish certificate from Manufacturer indicating date of manufacture.

1.3 DELIVERY, STORAGE, & HANDLING

A. Handle to prevent inclusion of foreign matter, damage by water, or breakage.

B. Deliver and keep in original containers until ready for use.

C. Do not use damaged or deteriorated materials.

D. Store in a cool place, but never under 40 deg F.

PART 2 PRODUCTS

2.1 MATERIALS

A. Sealants
   1. Sealants provided shall meet Manufacturer's shelf-life requirements.
   2. Interior -
      a. Inside jambs and heads of interior door frames
      b. Approved Manufacturers & Products -
         1) Trademate Paintable by Dow Corning
         2) Acrylic Latex 834 by Tremco
         3) Or approved equal
   3. Interior Acoustical Sealants -
      a. Perimeter joints and mechanical and electrical penetrations in sound insulated rooms.
      b. Approved Products & Manufacturers -
         1) Sound Caulking by Ohio Sealants
         2) Acoustical Sealant by Tremco
         3) Acoustical Sealant by U S Gypsum
   4. Color - As selected by Architect from Manufacturer's standard colors.

B. Backing - Flexible closed cell polyurethane or polyolefin rod or bond breaker tape as recommended by Sealant Manufacturer for joints being sealed.

2.2 MANUFACTURERS

A. Dow Corning Corp, Midland, MI (800) 622-0661, EX 40

B. G E Silicone Products, Waterford, NY (800) 255-8886
C. Ohio Sealants Inc, Mentor, OH (800) 322-3578
D. Tremco, Beachwood, OH 44122 (800) 321-7906
E. U S Gypsum, Chicago, IL (800) 964-4874

PART 3 EXECUTION

3.1 PREPARATION

A. Remove existing sealants where required. Surfaces shall be clean, dry, and free of dust, oil, grease, dew, or frost.

B. Apply primer.

C. Joint Backing
1. Rod for open joints shall be at least 1-1/2 times width of open joint and of thickness to give solid backing. Backing shall fill up joint so depth of sealant bite is no more than 3/8 inch deep.
2. Apply bond-breaker tape in shallow joints as recommended by Sealant Manufacturer.

3.2 APPLICATION

A. Apply sealant with hand-calking gun with nozzle of proper size to fit joints. Use sufficient pressure to insure full contact to both sides of joint to full depth of joint.

B. Tool joints immediately after application of sealant if required to achieve full bedding to substrate or to achieve smooth sealant surface.

C. Depth of sealant bite shall be 1/4 inch minimum and 1/2 inch maximum, but never more than one half or less than one fourth joint width.

D. Do not apply calking at temperatures below 40 deg F.

E. Calk opening perimeters unless indicated otherwise.

3.3 CLEANING

A. Clean adjacent materials which have been soiled immediately (before setting) as recommended by Manufacturer.

END OF SECTION

SECTION 08110

HOLLOW METAL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pressed steel hollow metal doors and frames.
2. Fire-rated hollow metal doors and frames.
3. Hollow metal window-walls, glazed openings, and other hollow metal frames for glass.
4. Metal louvers in hollow metal doors.
5. Rough bucks, frame reinforcing, door reinforcing, door insulation, closer reinforcements, clip angles and anchorage.
6. Factory prime paint finish.
7. Grouting of hollow metal frames with masonry mortar where not covered under other Sections.

B. Related Sections:

1. Section 04210 - Unit Masonry: Grouting of frames in masonry construction.
2. Section 08710 - Hardware: Finish hardware, weather-stripping and sound-stripping.
3. Section 08810 - Glazing: Glass and glazing.
4. Section 09900 - Painting: Finish painting.
5. Section 10210 - Metal Wall Louvers.
6. Section 08305 - Access Panels.

1.2 REFERENCES

A. ANSI A250.8-1998/SDI-100 - Recommended Specifications - Standard Steel Doors and Frames, Steel Door Institute, unless herein specified.

B. Underwriters' Laboratories Inc. (UL) UL 10C-98 – Fire Tests of Door Assemblies.

C. NFPA-80-1999 – Standard for Fire Doors and Windows.

D. NFPA-101-1997 – Life Safety Code.

E. NFPA-105 – Standard for Smoke and Draft Control Assemblies.

F. ASTM-A 366-95A – Specification for Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality.

G. ASTM-A 568-95 – Specification for Steel, Sheet, Carbon, and High Strength, Low-Alloy, Hot-Rolled, and Cold-Rolled.

H. ASTM-A 569-91a – Specification for Steel, Carbon, (0.15 maximum percent), Hot-Rolled Sheet and Strip Commercial Quality.

I. ASTM-A 924-95 – General Requirements for Steel Sheet, Metallic Coated by the Hot-Dip Process.

J. SDI-105-92 – Recommended Erection Instructions for Steel Frames.

K. ANSI A115.1-.18 - Specification for Door and Frame Preparation for Hardware.

L. ANSI A156.7 - Standard Template Hinge Dimensions.

1.3 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 01300. Indicate general construction, configurations, jointing methods, reinforcements, and location of hardware and cutouts for glass and louvers.

1.4 QUALITY ASSURANCE

A. Applicable Standards: Specifications and standards of SDI 100-98.

B. Wind Load Performance Requirements: Comply with wind load requirements of Uniform Building Code. Deflection shall not exceed 1/175 of span.

C. Supplier Qualification: Qualified direct distributor of products to be furnished. The distributor shall have in their regular employment an A.H.C./C.D.C. or person of equivalent experience who will be available at reasonable times to consult with the Architect, Contractor and/or Owner regarding any matters affecting the total door and frame openings.

D. Installer Qualification: Experience with installation of similar materials.

E. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated or required, provide fire-rated door and frame assemblies that comply with NFPA 80 "Standard for Fire Doors and Windows", and have been tested, listed, and labeled in accordance with ASTM E152 "Standard Methods of Fire Tests of Door Assemblies" by nationally recognized independent testing and inspection agency acceptable to authorities having jurisdiction.

1. Oversize Fire-Rated Door Assemblies: For door assemblies required to be fire-rated and exceeding sizes of tested assemblies, provide certificate or label from approved independent testing and inspection agency, indicating that door and frame assembly conforms to requirements of design, materials and construction as established by individual listings for tested assemblies.
2. Temperature Rise Rating: At stairwell enclosures, provide doors which have Temperature Rise Rating of 450 degrees F maximum in 30 minutes of fire exposure.

1.5 PRODUCT HANDLING

A. Deliver hollow metal doors in manufacturer's protective covering. Handle hollow metal with care to prevent damage.

B. Door Storage: Store doors in upright position, under cover. Place doors on at least 4 inch (101.6) high wood sills or on floors in manner that will prevent rust and damage. Do not use non-vented plastic or canvas shelters which create humidity chamber and promote rusting. If corrugated wrapper on door becomes wet, or moisture appears, remove wrapping immediately. Provide 1/4 inch (6.3) space between doors to promote air circulation.

C. Frame Storage: Store frames under cover on 4 inch wood sills on floors in manner that will prevent rust and damage. Do not use non-vented plastic or canvas shelters which create humidity chamber and promote rusting. Store assembled frames in vertical position, 5 units maximum in stack. Provide 1/4 inch space between frames to promote air circulation.

1.6 SEQUENCING AND SCHEDULING

A. Deliver doors and frames to the jobsite in a timely manner so as not to delay progress of other trades.

PART 2 PRODUCTS

2.1 HOLLOW METAL

A. Acceptable Manufacturers: (providing the products supplied comply with the provisions of this specification) Curries, Ceco, Fleming.

B. Cold Rolled Steel Sheets: Commercial quality, stretcher leveled flatness, cold-rolled steel, free from scale, pitting or other surface defects, complying with ASTM A366 and A568 general requirements.

C. Galvanealed Steel Sheets: ASTM A924, A60 zinc coating. Use galvanealed steel sheets for exterior hollow metal doors, door frames and door louvers. Internal reinforcing may be manufactured of hot rolled pickled and oiled steel per ASTM-A569.

D. Minimum gauges of hollow metal are specified below. Provide heavier gauge if required by details or specific condition. Entire frame and sidelight shall be of same gauge.

1. 16 gauge: Interior door frames, and glazed opening frames.
2. 16 gauge: Labeled frames (or heavier if required by label).
3. 18 gauge: Interior doors (or heavier if required by label).
4. 14 gauge: Exterior door frames, window-wall and window frames, transom and sidelight frames.
5. 16 gauge: Exterior doors.
6. 20 gauge: Trim members.

E. Coating Materials, primer: Use manufacturer's standard rust inhibiting primer conforming to ANSI-A224.1-1990.

2.2 RELATED MATERIALS

A. Steel Reinforcing: ASTM A36.

B. Door Bumpers or Silencers: Per ANSI A156.16.

2.3 HOLLOW METAL FRAMES

A. General: Form to profiles indicated. Where necessary, alternate details will be considered provided design intent is maintained. Consider and provide for erection methods.

B. Typical Reinforcing: Provide minimum hinge reinforcement 3/16 inch by 1-1/2 inch by 10 inch. Provide similar reinforcement for hardware items as required to adequately withstand stresses, minimum 12 gauge, including channel reinforcement for door closers and closer arms, door holders and similar items. Provide reinforcement and clearances for concealed in-head door closers and for mortise locks.

C. Cover Plates: For hinge and strike plate cutouts, provide fully enclosed pressed steel cover boxes spot welded to frames behind mortises.

D. Hardware: Mortise, reinforce, drill and tap for mortise hardware, except drilling and tapping for surface door closers, door closer brackets and adjusters shall be done in field.

E. Anchorage: Provide standard and special anchorage items as required. Provide formed steel channel spreader at bottom of frames, removable without damaging frame. At masonry, provide anchors (about 2 inch by 10 inch) approximately 24 inches on center.

F. Silencers: Provide specified silencers, except where stop does not occur and at smoke gasketed openings, 3 per jamb at single door and one for each door at double doors.

G. Extensions: Reinforce transom bars or mullions as necessary to provide rigid installation. Where required (as at multiple openings) to stabilize large frames, provide frame or mullion extensions to anchor to structure above, proper size to fit within overhead construction. Provide angle clips to fasten to structure.

H. Mullions: Provide mullions, straight and without twist, of tubular design. For removable mullions provide reinforcing at frame head.

I. Clearances: Provide and be responsible for proper clearances at metal frames, including for weatherstripping, soundstripping and smoke gasketing. Glass clearance shall be thickness of glass plus clearance each side (1/8 inch minimum exterior - 1/16 inch minimum interior), adjust for installation, glass thickness to allow for glazing and sealant. Where sealed double glazing is indicated, provide rebates minimum of 3/4 inch and provide 1/4 inch clearance at glass edges. Where units fit around concrete blocks (blocks built into frames) obtain actual dimensions of blocks being used to establish minimum clearances.

J. Drip Cap: Galvanized steel field painted per 09900. Secure to frame at exterior doors

K. Stops: Set with countersunk or Jackson head screws.
   1. Hospital Stops: On all doors except lead lined doors, doors in 2-hour fire rated partitions and one hour smoke and fire rated partitions; stops shall be cut at 6 inches above floor with 45 degree miter and welded closed.

L. Labeled Frames: Construct in accordance with requirements for labeled work. Attach proper U.L. label, Warnok Hersey. "B" labeled frames shall be 1-1/2 hour construction.

M. Joinings: At frames with equal width jambs and head, neatly miter on face (except locations as at transom bars and at frames with large head members). Cope and butt stops. Weld length of entire joint, including face and flat intersections. Grind smooth, at other frames, provide same mitered joint wherever possible (at intersection of jamb-head or jamb-sill) and at other locations butt metal neatly and full weld. If tight butt joints are utilized, joints shall be neatly caulked smooth.

N. Workmanship: Fabricate so no grind marks, hollow or other out-of-plane areas are visible. At joints of intermediate members (such as mullions and transom bars), provide tight joining, neatly accomplished without holes, burned out spots, weld build up or other defacing work. Fill to close cracks and to preserve shapes. Tightly fit loose stops, to hairline joints.

O. Finish: Clean frames by degreasing process and apply thorough coating of baked-on primer, covering inside as well as outside surfaces. At galvanealed frames, coat welds and other disrupted surface with zinc-rich paint containing not less than 90 percent zinc dust by weight.

Hollow Metal Frames with electric through wire (08110)

A. Provide all hollow metal frames receiving electrified hardware with ElectroLynx™ wiring harness and concealed plug connectors on one end to accommodate up to twelve wires.

B Coordinate ElectroLynx™ connectors on end of the wiring harness to plug directly into the electrified hardware and the electric hinge.

2.4 HOLLOW METAL DOORS

A. Provide to design indicated including: Flush panel doors, flush panel with cut-out as indicated, stile and rail type, stile and rail with door louver. Use galvanealed steel at exterior doors.

B. Flush Doors: Reinforce, stiffen and sound deaden. Provide cut-outs for glass and louvers with stops as shown. Provide flush steel closure at top of exterior and interior doors and at bottom of exterior doors with drain holes in bottom closure. Provide seamless edge. Following door construction types are acceptable.
   1. Exterior Doors (and Interior Reinforced Doors): 20 gauge steel stiffener reinforced vertically 6 inches o.c. full height and width, spot welded 5 inches o.c. to both face sheets. Stiffeners welded together top and bottom. Insulate with fiberglass batt insulation.
   2. Composite Core Interior Doors (Typical): Polystyrene core permanently laminated to inside face sheets.
   3. Door Construction: Manufacturer's standard polystyrene, polyurethane foamed in place, vertical steel stiffeners, or rigid mineral fiber core with internal sound deadener on inside of face sheets where appropriate in accordance with SDI standards.

C. Labeled Doors: Insulate as required by Underwriters Laboratories. Build in special hardware and provide astragals as indicated. At one hour and at 1-1/2 hour doors at enclosures, maximum transmitted temperature end point shall not exceed 450 degrees F above ambient at end of 30 minutes of fire exposure per U.L..

D. Seamless Vertical Edges: Construct doors with smooth flush surfaces, without visible joints or seams on exposed faces or stile edges. Interior and exterior door edge seams shall be full height wire welded and ground smooth.

E. Exterior Hollow Metal Door Louvers: Fabricate louver units of 16-gauge galvanized steel sheets with stationary, weatherproof Z-shaped blades and U-shaped frames, not less than 1-3/8 inch thick. Space louver blades not more than 1-1/2 inch o.c. Assemble units by welding. Provide insect screen on interior side of frame, consisting of 14 by 18 wire mesh in rigid, formed metal frame.
   1. Interior Hollow Metal Door Louvers: Fabricate of 20-gauge cold-rolled steel sheets with stationary sightproof inverted V-shaped blades and U-shaped frames. Space louver blades not more than 3 inches o.c. Assemble units by welding.

F. Typical Reinforcement: Provide as required for hardware items. For lock reinforcement, provide manufacturer's standard reinforcement. Provide 12 gauge reinforcement for escutcheons or roses. centering clips to hold lock case in alignment. For door checks, provide 3/16 inch channel type reinforcements, 3-1/2 inch deep by 14 inches long, or as required. Hinge reinforcement minimum 7 gauge by 1-1/2 inch by 9 inch bar. Weld reinforcing to door. Reinforce doors for surface items such as surface and semi-concealed closers, brackets, surface holders and door stops. Drilling and tapping installation of these surface items shall be done in field by hardware installer.

G. Special Reinforcing: At exterior doors, reinforce inside of door on hinge side with high frequency hinge preparation. Weld to door.

H. Hardware: Mortise, reinforce, drill and tap for hardware furnished under Section 08710 - Hardware, except drilling and tapping for surface door closers, door closer brackets and adjusters shall be done in field. Obtain templates from hardware supplier.

I. Finish: Provide prime coat finish on doors. Thoroughly clean off rust, grease and other impurities. Grind welds smooth, no marks shall show. Apply metallic filler as required to fill cracks and joints and to level any weld areas or similar imperfections. Sand filler coat smooth.

Hollow Metal Doors with electric through wire (08110)

A. Provide all hollow metal doors receiving electrified hardware with ElectroLynx™ through-door wiring harness and concealed plug connectors on each end to accommodate up to twelve wires.

B Coordinate ElectroLynx™ connectors on each end of the wiring harness to plug directly into the electrified hardware and the electric hinge.

Stile & Rail Doors

1. Stiles and rails are to be constructed of 16 gauge insulated tubular steel.
   a. Stiles and top rail are to be 5-5/8"" and bottom rail is to be 12-5/8".
   b. Provide 5-5/8" center rail as directed.

2. Corners are to be continuously welded.

3. Hinge reinforcement to be not less than 7 gage (3/16") plate 1-1/4" X 9".

4. Top of door is to be flush with no exposed seam.

5. Glazing system is to provide flush glazing.

6. Lock and hinge edges are to be beveled.

7. Acceptable Manufacturers:
   a. Ceco Door Products-Thrulite
   b. Curries – Stile & Rail

2.5 HOLLOW METAL PANELS

A. Same materials and constructed and finished in same way as specified for hollow metal doors.

2.6 FASTENINGS

A. Provide fastenings, anchors and clips as required to secure hollow metal work in place. Provide Jackson head screws, or flatter. Dimple metal work to receive screw heads. Set stops and other non-structural fastenings with #6 Jackson head self-tapping screws.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine supporting structure and conditions under which hollow metal is to be installed. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install hollow metal in accordance with reviewed shop drawings and manufacturer's printed instructions. Securely fasten and anchor work in place without twists, warps, bulges or other unsatisfactory or defacing workmanship. Set hollow metal plumb, level, square to proper elevations, true to line and eye. Set clips and other anchors with Ramset "shot" anchors or drill in anchors as approved. Units and trim shall be fastened tightly together, with neat, uniform and tight joints.

B. Placing Frames: Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces and spreaders leaving surfaces smooth and undamaged. In masonry construction, building-in of anchors and grouting of frames with mortar is specified in Section 04210 - Unit Masonry. At in-place concrete or masonry construction, set frames and secure in place using countersunk bolts and expansion shields, with bolt heads neatly filled with metallic putty, ground smooth and primed.

C. Place fire-rated frames in accordance with NFPA Standard #80.

D. Door Installation: Fit hollow metal doors accurately in their respective frames, within following clearances: Jambs and head 3/32 inch, meeting edges pair of doors 1/8 inch, sill where no threshold or carpet 1/4 inch above finished floor, sill at threshold 3/4 inch maximum above finished floor, sill at carpet 1/4 inch above carpet. Place fire-rated doors with clearances as specified in NFPA Standard #80.

3.3 ADJUSTING AND CLEANING

A. Prime Coat Touch-Up: Immediately after installation, sand smooth rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.

B. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION

SECTION 08210

WOOD DOORS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Prefinished standard and fire rated type wood doors with flush faces.
   2. Prefit and premachine pre-finished wood doors.

B. Related Sections:
   1. Section 06100 - Rough Carpentry.
   2. Section 06460 - Wood Frames.
   3. Section 08110 - Hollow Metal Doors and Frames.
   4. Section 08710 - Hardware.
   5. Section 08810 - Glazing: Glass and glazing for doors.
   6. Section 06405 - Architectural Woodwork.

1.2 REFERENCES

A. WDMA – Window and Door Manufacturers Association: IS 1-A 1997 Industry Standard for Architectural Flush Wood Doors.

B. NFPA-80 Standards for Fire Doors.

C. International Building Code: (IBC), Fire Test of Door Assemblies. Use current version in effect.

1.3 SUBMITTALS

A. Shop Drawings and Product Data:
   1. Submit in accordance with Section 01330.
   2. Indicate general construction, jointing methods, hardware and louver locations, and locations of cut-outs for glass. Indicate thickness of veneers.

B. Samples:
   1. Submit samples of wood veneer and factory finishing in accordance with WDMA Quality Standards I.S. 1-A 1997, sections G-18 and Guide Specifications 1.03 C.

C. Certification:
   1. Submit certification that doors and frames comply with UBC 7-2 1997.

1.4 QUALITY ASSURANCE

A. Fire-Rated Wood Doors: Provide wood doors which are identical in materials and construction to units tested in door and frame assemblies in accordance NFPA 252 and which are labeled and listed for ratings indicated by ITS – Warnock Hersey, UL or other testing and inspection agency acceptable to authorities having jurisdiction.
   1. Doors: Comply with UBC 7-2 1997 where required.
   2. Provide intumescent requirements in compliance with UL-10C.

B. WDMA I.S. 1-A 1997 Quality Standard: Window and Door Manufacturers Association Quality Standards for grade of door, core, construction, finish, and other requirements.

C. Temperature Rise Rating: At stairwell enclosures, provide doors which have Temperature Rise Rating of 250 degrees F maximum in 30 minutes of fire exposure.

1.5 PRODUCT HANDLING

A. Plastic wrap and protect wood doors during transit, storage and handling to prevent damage, soiling or deterioration. Follow the Care and Installation guidelines as described in WDMA I.S. 1-A 1997.

1.6 GUARANTY/WARRANTY

A. Guarantee: Provide manufacturer's guarantee for all wood doors. Guarantee period: Lifetime of original installation. Doors exhibiting defects in materials or workmanship including warp and delamination within guarantee period shall be replaced (including hanging and finishing) with new doors. These terms shall be part of the manufacturer's standard warranty.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Graham Manufacturing

B. Eggers Industries

C. Algoma Hardwoods

2.2 MATERIALS

A. Door Construction:
   1. Non-Fire Rated Doors: Thickness: 1-3/4 inches, interior flush wood, bonded, solid core conforming to WDMA I.S. 1-A 1997 and the following;
      a. Core: bonded particle core (PC) conforming to WDMA I.S. 1-A 1997.
      b. Door construction shall conform to WDMA I.S. 1-A 1997 Premium Grade requirements.
      c. Stiles: Hardwood to match face veneer over structural composite lumber (SCL), glued to core.
      d. Rails: Mill option hardwood or SCL. Top and bottom: 2 inches.
      e. Facing: Wood veneer as specified.
   2. Fire Rated Doors: Thickness: 1-3/4 inches, interior flush wood, bonded, solid core conforming to WDMA I.S. 1-A 1997 and the following;
      a. Core: bonded mineral core (FD) conforming to WDMA I.S. 1-A 1997.
      b. Door construction shall conform to WDMA I.S. 1-A 1997 Premium Grade requirements.
      c. Stiles: Hardwood to match face veneer over mineral composite, glued to core.
      d. Rails: Mineral composite as required by fire door authorities. Top and bottom: as required by manufacturer's fire door authorities.
      e. Facing: Wood veneer as specified.

B. WOOD VENEER
   1. Door face veneers shall meet HPVA "A" grade quality standards conforming to WDMA I.S. 1-A for transparent or semi-transparent finish. Minimum face veneer thickness shall be 1/50" at 12% moisture content after finish sanding.
   2. Species: Red Oak.
   3. Face Cut: Plain Sliced.
   4. Face Assembly: Book Match.
   5. Face Symmetry: Running Match.

C. ADHESIVES

1. Adhesives: Face to core adhesives shall be Type I or Type II as appropriate for location in building. Adhesives must be classified Type I or Type II per WDMA TM-6 “Adhesive Bond Test Method”, or PUR adhesive. Type I adhesives shall be used for doors in exterior applications, Type II adhesives shall be used for doors in interior applications.

D. CORE
   1. Non-rated and 20 minute doors: Solid particleboard.
   2. Fire-rated doors: Non-combustible mineral core containing no asbestos.

2.3 FACTORY FINISHING

1. Comply with referenced WDMA Section G-15, “Factory Finishing.”.
2. Pre-finish wood doors at factory.
3. Transparent Finish: Match finish indicated in WDMA Section G-17: WDMA System #6.

2.4 ACCESSORIES

A. Vision Frames:
   1. Non-rated doors: Flush wood frames, hardwood to match facing.
   2. 20 minute fire rated doors: Provide manufacturer's tested metal clip or comparable system with wood stop appearance.
   3. Fire-rated doors: ITS – Warnock Hersey or UL approved glazing system.
   4. Glass: Refer to Section 08810 for glass types.

2.5 FABRICATION

A. Fabricate wood doors in accordance with requirements of WDMA I.S. 1-A 1997 Quality Standards.

B. Fabricate fire rated doors in accordance with requirements of ITS – Warnock Hersey or Underwriters' Laboratories, with metal label on each door including UL-10C.

C. Fabricate doors with WDMA Quality Standards hardware blocking options as follows:
   1. Provide HB-1 – head and HB-2 – sill rails and HB-4 – lockblock on all doors.
   2. Provide HB-6 only when exit devices are specified for door.
   3. Provide HB-8 for pivots or when floor bolts are specified under Section 08710 – Finish Hardware.

D. Provide doors with minimum ¼ inch thick edge strips, of wood species to match face veneers except as required for fire rating.

E. Make cut-outs and provide stops for glass and louvers. Install metal door louvers. Seal cut-outs prior to installation of moldings.
   1. For full light doors: Provide cut out from flush wood door, with vertical grain direction.

F. Bevel lock and hinge edges of single acting doors 3 degrees or 1/8 inch in 2 inches. Radius strike edge of double acting swing doors as required by pivot hinge manufacturer.

G. Prepare doors to receive hardware. Refer to Section 08710 - Hardware and NFPA 80 for hardware requirements including UL-10C.
   1. Prefit and bevel to net opening size less approximately 1/4 inch in width on single swing doors 3/16 inch in width for paired doors. Provide 1/4 inch clearance above finished floor, unless otherwise indicated on drawings. Provide 1/8 inch clearance at top of door.
   2. Slightly ease vertical edges.

H. Fire Rated Pair of Doors; greater than 20 minute: Supply overlapping astragals or metal edge sets only as required by NFPA 80 1999 or by door manufacturer’s fire door authorities. If an astragal is required, to comply with fire rated labeling requirements for pairs of fire rated doors, provide door manufacturer's standard tested astragal.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine installed door frames before hanging doors.

B. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Handle doors in accordance with recommendations of WDMA I.S. 1-A, “Care and Installation at Job Site.”

B. Condition doors to average temperature and humidity in area of installation for not less than 48 hours prior to installation. Store doors per recommendations of WDMA I.S. 1-A, “Care and Installation at Job Site.”

C. Install in neat and workmanlike manner, free from hammer or tool marks, open joints or slivers.

D. Set plumb, level, square and true. Install work after building humidity is at acceptable level.

E. Remove and replace all doors found to be warped, twisted, bowed, or otherwise damaged. Do not install doors which cannot be properly fitted to frames.

F. Adjust prefinished doors and hardware and other moving or operating parts to function smoothly and correctly.

G. If doors are to be field finished, the process must follow the WDMA I.S. 1-A, “Care and Handling at Job Site” instructions for field applied finishes.

H. Ensure that smoke gaskets are in-place before prefinished door installation.

3.3 CLEANING AND PROTECTION

A. Clean prefinished doors and hardware.

B. At clear finished doors, do not partially cover door surfaces with paper, cardboard, or any other opaque covering that will create uneven aging of wood veneer.

C. Protect doors as directed under Section 01700.

D. Refinish or replace finished doors damaged during installation.

END OF SECTION

SECTION 08305

ACCESS DOORS

PART 1 GENERAL

1.1 SUMMARY

A. Products Supplied But Not Installed Under This Section
   1. Pre-manufactured access doors.

B. Related Sections
   1. Division 03 - Installation in floor slabs
   2. Division 06 -
      a. Installation in framing or masonry
      b. ield fabricated access doors

PART 2 PRODUCTS

2.1 MANUFACTURED UNITS

A. Access Doors
   1. Single leaf.
   2. Manually operated with key operated lock, cam handle, and concealed continuous piano hinge hardware.
   3. Factory prime finish.
   4. Ceiling or Wall Access -
      a. Fire rated.
      b. Quality Standard -
         1)KRP150FR by Karp
   5. Floor Access -
      a. Quality Standards -
         1) Resilient Flooring - Recessed Floor Door by Karp
         2) Concrete - Flush Floor Door by Karp

2.2 APPROVED MANUFACTURERS

A. Babcock-Davis Associates Inc, Arlington, MA (617) 643-5344
B. The Bilco Company, New Haven, CT (203) 934-6363
C. Cesco, Minneapolis, MN (612) 424-4919
D. Dur-Red Products, Cudahy, CA (213) 771-9009
E. Elmdor Access Doors, City of Industry, CA (818) 968-8699
F. Jensen, Los Angeles, CA (800) 325-8351
G. J. L. Industries, Bloomington, MN (612) 835-6850
H. Karp Associates Inc, Maspeth, NY (800) 888-4212
I. Larsen's Manufacturing Co, Minneapolis, MN (800) 527-7367
J. Milcor Limited Partnership, Lima, OH (419) 227-6899
K. Nystrom Inc, Minneapolis, MN (800) 547-2635
L. Williams Brothers Corporation of America, Front Royal, VA (800) 255-5515
M. Equal as approved by Architect before bidding. See Section 01600.

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 08410

ALUMINUM ENTRANCES & STOREFRONTS

PART 1 GENERAL

1.1 SUMMARY

A Includes But Not Limited To
1. Furnish and install aluminum storefront entry system, including glazing and calking, as described in Contract Documents.

B. Related Sections
1. Division 07 - Quality of sealants
2. Section 08800 - Quality of glass and glazing

1.2 REFERENCES

A. American Society For Testing And Materials
1. ASTM B 221-92a, "Specifications for Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes & Tubes"

1.3 SUBMITTALS

A. See Section 01300.

B. Product Data
1. Manufacturer's literature or cut sheets
2. Color and finish selection
3. Maintenance, adjustment, and repair instructions

C. Shop Drawings
1. Show locations, sizes, etc, of hardware reinforcing.
2. Show wind loads and engineering for Project conditions.

D. Quality Assurance/Control - Installer shall submit list of five Projects minimum using specified system and located as close as possible to Project site.

1.4 QUALITY ASSURANCE

A. Qualifications - Systems to be installed and adjusted by personnel factory trained in installation and adjustment of system and having five years installation experience with system.

B. Pre-Installation Meeting - Schedule meeting for one week prior to scheduled installation of storefront system.

PART 2 PRODUCTS

2.1 MATERIAL

A. Manually Operated Doors
1. Aluminum - 6063 T5 aluminum alloy, or meeting requirements of ASTM B 221, alloy GS 10A-T5
2. Stiles & Top Rails - 3-1/2" by 1-3/4" by 0.125" thick nominal
3. Bottom Rail - 10" minimum x 1-3/4" x 0.125" thick nominal
4. Construction - Manufacturer's standard.
5. Glazing Stops - Snap-in type with neoprene bulb-type glazing. Units shall be glazed from

exterior side.

6. Weatherstripping - Neoprene bulb-type equal to Kawneer "Sealair".
7. Finish -
   a. Polyvinyledene Fluoride (PVF_2) Resin-base finish (Kynar 500 or Hylar 5000) containing 50 percent minimum PVF_2 in resin portion of formula and providing a pencil hardness of 3H. Thermo cured two coat system consisting of corrosion inhibiting epoxy or acrylic latex primer and top coat factory applied over properly pretreated metal.
   b. AA-M12C22A42 Class I Dark Bronze anodized.
8. Approved Models -
   a. edium Stile Door by Capital
   b. Series 300 by EFCO
   c. 350 Medium Stile by Kawneer
   d. MS Series by Southwest Aluminum
   e. #400 Medium Stile by United States Aluminum
   f. Series 375 by Vistawall
   a. Latching Double Doors Without Mullion - PanicGuard 350 by Kawneer

B. Frames
1. Aluminum - 6063-T5 aluminum alloy or meeting requirements of ASTM B 22l-88, alloy GS 10A-T5)
2. Mullion - Steel reinforced or heavy duty as necessary to prevent flexing of mullion.
3. Sills - Sidelight base to match height of door bottom rail.
4. Sealer Tape - 3M
5. Fasteners - Aluminum or non-magnetic stainless steel. Concealed fastenings shall be cadmium or zinc-plated steel.
6. Finish - Match doors
7. Calking - For threshold only, as required in Section 07 920.
8. Frames shall be from same Manufacturer as doors.
9. Approved Systems -
   a. .Double Glazed -
      1) IFG" System by Capital
      2) System 402 by EFCO
      3 Trifab "451" by Kawneer
      4) Series IG451 by Southwest Aluminum
      5) Series 451 by United States Aluminum
      6) Series 3000 2x4-1/2 by Vistawall

C. Glazing Characteristics
1. Interior Vestibule Glazing - Clear
2. Exterior Entry Doors & Storefront - Low E / Obscure

2.2 APPROVED MANUFACTURERS

A. Capital Glass & Aluminum Corp, Salt Lake City, UT (800) 453-6226
B. EFCO, Monett, MO (800) 221-4169
C. Kawneer Company Inc, Norcross, GA (404) 449-5555
D. Southwest Aluminum, Chandler, AZ (800) 544-4044
E. United States Aluminum Corp, Vernon, CA (213) 268-4230
F. Vistawall, Terrell, TX (214) 563-2624

2.3 FABRICATION

A. Construction shall meet Manufacturer's recommendations. Joints shall be tightly closed.

B. Adequately reinforce with backplates or rivnuts to hold pivots and closers.

PART 3 EXECUTION

3.1 ERECTION

A. Bed threshold in silicone sealant at contact points with floor and make watertight.

B. Accurately fit thresholds.

C. se sealer tape to prevent electrolytic action.

D. Follow Manufacturer's recommendations for erection.

E. Set plumb, square, level in correct alignment, and securely anchor. Line up horizontal rail in sidelight with door rail.

F. Adjust doors for perfect operation after glazing entry. Calk joints between frames and walls, both interior and exterior.

3.2 FIELD QUALITY CONTROL

A. Site Tests
   1. Test anodizing with isoscope if requested by Architect.
   2. Pull test doors, especially pairs of single doors separated by permanent mullions, to ensure security of opening.

3.3 PROTECTION

A. Protect surface from damage until Substantial Completion Inspection. Repair or replace damaged materials at no cost to Owner.

END OF SECTION

SECTION 08521

ALUMINUM HUNG WINDOWS

PART 1 GENERAL

1.1 SUMMARY

A. Products Supplied But Not Installed Under This Section
   1. Metal single hung window units complete with glazing.
   2. Necessary anchors and accessories, including glazing beads.

B. elated Sections
   1. Division 06 - Installation
   2. Section 08410 - Metal storefront at entries
   3. Section 08800 - Quality of glazing

1.2 YSTEM DESCRIPTION

A. Design Requirements
   1. Comply with minimum test requirements of ANSI/AAMA 101-88 for classification of specified window in following -
      a. Air infiltration
      b. Water Resistance
      c. Uniform structural load
   2. ANSI/AAMA 101-88 classification DH-C-45 minimum for hung windows, tested at 4'0" wide by 7'0" high minimum.

B. Performance Requirements
   1. Meet following thermal performance -
      a. Condensation Resistance Factor (CRF) of 48 minimum when tested in accordance with AAMA 1502 Standards.
      b. Thermal Transmittance of 0.65 maximum when tested in accordance with AAMA 1503 Standards.

1.3 SUBMITTALS

A. See Section 01300.

B. Product Data
   1. Manufacturer's literature or cut sheet
   2. Literature on glazing
   3. Color and finish selection

C. Samples - Samples of anchoring devices to be used in window installation.

D. Quality Assurance/Control
   1. Copies of test results from independent laboratory verifying -
      a. AAMA classification with which windows comply
      b. Specified design requirements
      c. Copy of Manufacturer's written installation instructions.

PART 2 PRODUCTS

2.1 ANUFACTURED UNITS

A. Windows
1. Preglazed, operable type, individual window units
a. Weatherstripped.
b. Thermally broken system with poured-in-place and de-bridged structural thermal break.
c. Tilt-in operating sash with custodial release for tilt feature or side load take out sash.
d. Receptor or sub-frame.
e. Finish & Color -
1) Meet requirements of AAMA 603.8 for baked-on organic coating.
1) Meet requirements of AAMA 605.2 high performance organic coating.
1) Meet requirements of AAMA Architectural Class II minimum anodizing.
2) Color as selected by Architect from Manufacturer's standard colors.
2. Glazing Characteristics -
Obscure / Low E
3. Glazing Beads - Manufacturer's standard.
4. Screens - Extruded aluminum frames with mitered corners and 18 x 14 mesh with 0.013 inch diameter aluminum wire or fiberglass.
5. Approved Manufacturers -
a. 695 by Alenco, Bryan, TX (800) 444-1444
b. Series 3200 by Graham Architectural Products Corp, York, PA (717) 849-8100
c. Series 6315T by Kawneer, Norcross, GA (404) 449-5555
d. Model 4120 by Peerless Products Inc, Shawnee Mission, KS (800) 279-9999
e. Series 500 or 700 by Thermal Windows Inc, Tulsa, OK (800) 259-7580
f. odel TR-5000 by Traco, Warrendale, PA (800) 837-7002

2.2 ACCESSORIES

A. nchoring Devices
1. Aluminum or stainless steel.
2. Other corrosion-resistant or insulated anchors as specifically approved by Architect in writing prior to use.

2.4 SOURCE QUALITY CONTROL

A. When delivered to Project, windows shall bear label stating model of window and Manufacturer's name, or AAMA label.

PART 3 EXECUTION

3.1 INSTALLATION

A. Experienced mechanics shall install windows. Do not force windows into openings.

B. Set receptors or sub-frames plumb, level, and in alignment. Secure window proper to receptor or sub-frame with anchors and fastening devices supplied by Manufacturer.

C. Bed joints at mullions and contacts of windows with sills in specified sealant. Trim off excess sealant.

D. Avoid direct contact between aluminum and adjacent steel work by insulating with materials equal to 3M's EC 1202 tape if materials are in pressure contact, or with bituminous paint if pressure between surfaces cannot be maintained.

E. Protect aluminum window surfaces from adjacent work as necessary.

3.2 FIELD QUALITY CONTROL

A. Notify Architect when windows are to be delivered to Project site to allow opportunity for Architect's inspection prior to installation.

3.3 ADJUSTING

A. After windows are in place, installer shall adjust hardware and ventilators to operate smoothly and be weathertight when closed.

3.4 CLEANING

A. After installation, clean interior and exterior metal surfaces of windows and accessories of mortar, plaster, paint, and other contaminants. Maintain protection and provide final cleaning.

END OF SECTION

SECTION 08710

HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Finish hardware for doors as specified and as listed in "Hardware Groups" and required by actual conditions.
   1. Include screws, special screws, bolts, special bolts, expansion shields, and other devices for proper application of hardware.

B. Related Sections:
   1. Section 06101 (06 10 10): Carpentry
   2. Section 08110 (08 11 00), Section 08120 (08 12 00), and Section 08211 (08 21 00) - Certain hardware items installed with doors.
   3. Division 16: Electrical.

1.02 GENERAL REQUIREMENTS

A. Provide items, articles, materials, operations and methods listed, mentioned or scheduled herein or on drawings, in quantities as required to complete project. Provide hardware that functions properly. Prior to furnishing hardware, advise Architect of items that will not operate properly, are improper for conditions, or will not remain permanently anchored.

1.03 SUBMITTALS

A. Hardware Schedule: Submit 5 copies of hardware schedule in vertical format as illustrated by the Sequence of Format for the Hardware Schedule as published by the Door and Hardware Institute. Schedules which do not comply will be returned for correction before checking.

B. Hardware schedule shall clearly indicate architect's hardware group and manufacturer of each item proposed.

C. The schedule shall be reviewed prior to submission by a certified Architectural Hardware Consultant (AHC), who shall attest to the completeness and correctness of the schedule.
   1. Provide 2 copies of illustrations from manufacturer’s catalogs and data in brochure form.
   2. Check specified hardware for suitability and adaptability to details and surrounding conditions. Indicate unsuitable or incompatible items and proposed substitutions in hardware schedule.
   3. Provide listing of manufacturer's template numbers for each item of hardware in hardware schedule.
   4. Furnish other Contractors and Subcontractors concerned with copies of final approved hardware schedule. Submit necessary templates and schedules as soon as possible to hollow metal, wood door, and aluminum door fabricators in accordance with schedule they require for fabrication.
   5. Samples: Lever design or finish sample: Provide 3 samples if requested by architect.

D. Installation Instructions: Provide manufacturer's written installation and adjustment instructions for finish hardware. Send installation instructions to site with hardware.

E. Templates: Submit templates and "reviewed Hardware Schedule" to door and frame supplier and others as applicable to enable proper and accurate sizing and locations of cutouts and reinforcing.

F. Contract Closeout Submittals: Comply with Section 01700 including specific requirements indicated below.
   1. Operating and maintenance manuals: Submit 3 sets containing the following:
   2. Complete information in care, maintenance, and adjustment, and data on repair and replacement parts, and information on preservation of finishes.
   3. Catalog pages for each product.
   4. Name, address, and phone number of local representative for each manufacturer.
   5. Parts list for each product.
   6. Copy of final approved hardware schedule, edited to reflect "As installed".
   7. Copy of final keying schedule.

8. As installed "Wiring Diagrams" for each opening connected to power, both low voltage and 110 volts.
9. One complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

G. On additions and renovations to existing facilities, contractor shall meet with owner to determine specific owner requirements regarding keying, special applications, brands, etc. and advise Architect if any revisions to the specification are required. Any changes to the specification must be in writing. Verbal authorization is not considered as valid.

1.04 QUALITY ASSURANCE

A. Manufacturer: Obtain each type of hardware (ie. latch and locksets, hinges, closers) from single manufacturer, although several may be indicated as offering products complying with requirements.

B. Supplier: Recognized architectural finish hardware supplier, with warehousing facilities, who has been providing hardware for period of not less than 3 years. The supplier shall be, or employ, a certified Architectural Hardware Consultant (AHC), who is registered in the continuing education program as administered by the Door and Hardware Institute. The hardware schedule shall be prepared and signed by a certified AHC.

C. Installer: Firm with 3 years experience in installation of similar hardware to that required for this project, including specific requirements indicated.

D. Regulatory Label Requirements: Provide nationally recognized testing agency label or stamp on hardware for labeled openings. Where UL requirements conflict with drawings or specifications, hardware conforming to UL requirements shall be provided. Conflicts and proposed substitutions shall be clearly indicated in hardware schedule.

E. Pre-Installation Conference: Prior to the installation of hardware, manufacturer's representatives for locksets, closers, and exit devices shall arrange and hold a jobsite meeting to instruct the installing contractor's personnel on the proper installation of their respective products. A letter of compliance, indicating when this meeting is held and who is in attendance, shall be sent to the Architect and Owner.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver hardware to jobsite in manufacturer's original packaging, marked to correspond with approved hardware schedule. Do not deliver hardware until suitable locked storage space is available. Check hardware against reviewed hardware schedule. Store hardware to protect against loss, theft or damage.

B. Deliver hardware required to be installed during fabrication of hollow metal, aluminum, wood, or stainless steel doors prepaid to manufacturer.

1.06 WARRANTY

A. Guarantee workmanship and material provided against defective manufacture. Repair or replace defective workmanship and material appearing within period of one year after Substantial Completion.

B. Provide ten year factory warranty on door closer body against defects in material and workmanship from date of occupancy of Project.

C. Replace shortages and incorrect items with correct material at no additional cost to Owner.

D. At completion of project, qualified factory representative shall inspect closer installations. After this inspection, letter shall be sent to Architect reporting on conditions, verifying that closers have been properly installed and adjusted.

PART 2 PRODUCTS

2.1 BUTTS AND HINGES

A. Acceptable Manufacturers and Types:

McKinney	T4A3795	TA2714	TA2314	T4A3786	T4A3386

B. Application:

1. Provide NRP (non-removable pins) at out-swinging lockable doors.

C. Size:

1.	2-1/4 inch Doors	5 inch by 5 inch
2.	1-3/4 inch Doors	4-1/2 inch by 4-1/2 inch
3.	1-3/8 inch Doors	3-1/3 inch by 3-1/2 inch

D. Quantity:

1. 2 - hinges per leaf for openings through 60 inches high.
2. 1 - additional hinge per leaf for each additional 30 inches in height or fraction thereof.
3. 4 - Dutch doors up to 90 inches in height.

E. Drill 5/32 inch hole and use No. 12, 1-1/4 inch steel threaded to the head wood screws for hinges on wood doors.

2.2 CONTINUOUS GEARED HINGES

A. Acceptable manufacturers:

Manufacturer		
McKinney	MCK-12HD	MCK-25HD
Markar	FM101	FM111
Pemko	FM__SLFHD	FM__HD

B. Provide one of the above two models of continuous hinges as appropriate for the type, inset, and thickness of door where specified. Coordinate hinge types with the door supplier.

2.3 LOCKSETS – MORTISE

A. Acceptable Manufacturer and Series:

Manufacturer	Series
Sargent	8200
Yale	8800FL
Corbin/Russwin	ML2000

B. Provide lock functions specified in Hardware Groups, with following provisions:

1. Locksets shall meet the requirements of ANSI/BHMA A156.13-1994, Operational Grade 1, and Security Grade 1.
2. Backsets: 2-3/4 inches.
3. Strikes: Provide wrought boxes and strikes with proper lip length to protect trim but not to project more than 1/8 inch beyond trim, frame or inactive leaf. Where required, provide open back strike and protected to allow practical and secure operation.
4. All locksets and latches are to be BHMA Certified.

2.4 EXIT DEVICES

A. Acceptable Manufacturers:

Manufacturer	
Sargent	80 Series
Yale	7000 Series
Corbin/Russwin	ED5000 Series

B. Provide exit device series and functions as specified in Hardware Groups.

C. All exit devices shall be UL listed for panic. Exit devices for labeled doors shall be UL listed as "Fire Exit Hardware".

D. Where lever trim is specified, provide lever design to match lockset levers.

E. Provide cylinders for exit devices with locking trim, key removable mullions and cylinder dogging.

F. All exit devices are to be BHMA Certified.

2.5 KEYING

A. Acceptable Manufacturers and Types:

Manufacturer
Match Owner's existing key system.

B. Master key or Grand master key cylinders and key in groups, unless otherwise specified. Factory masterkey with manufacturer retaining permanent keying records.

C. Provide 6 masterkeys for each masterkey set. Provide 3 change keys for each lock. Provide 2 control keys for core removal. Stamp keys "DO NOT DUPLICATE."

D. Submit proposed keying schedule to Architect. If requested, meet with Owner and Architect to review schedule.

E. Provide high security removable core cylinders, with patented key control, for each lock with construction masterkeying. Permanent cores shall be installed upon completion of the project.

2.6 DOOR TRIM

A. Acceptable Manufacturers and Types:

Manufacturer					
McKinney	DP503	P053	PB801	OP4513	OP810
Trimco	1013-3	1001-3	1741		1737
Quality	1510-5	40-5	473		484

B. Push Plates:

1. Push plates are to be 0.050" thick with four beveled edges.

C. Push Bars:

1. McKinney type PB801, unless otherwise indicated.

D. Pulls:

1. McKinney Series OP4015, unless otherwise indicated.
2. Where required, mount back to back with push bars.

E. Kick Plates and Armor Plates:

1. Minimum of 0.050 inch thick, beveled 4 edges.
2. Height of 10 inches, unless otherwise indicated.

F. Edge Guards:

1. Minimum .050" thick, stainless steel,
2. As noted in Hardware Groups.

2.7 DOOR CLOSERS

A. Acceptable Manufacturers and Types of Exposed Closers:

Manufacturer	
Norton	7500/PR7500
Sargent	351/351-P10
Yale	4400/PR4400
Corbin/Russwin	DC8000

B. Provide non-sized closers, adjustable to meet maximum opening force requirements of ADA.

C. Provide drop plates, brackets, or adapters for arms as required to suit details.

D. Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.

E. Provide back-check for closers.

F. Provide hold-open arms where indicated.

G. Provide closers for doors as noted in Hardware Groups and, in addition, provide closers for labeled doors whether or not specifically noted in group.

H. Provide closers meeting the requirements of UBC 7-2, 1997 and UL 10C positive pressure tests.

I. All door closers shall be BHMA Certified.

2.8 WALL STOPS AND HOLDERS

A. Acceptable Manufacturers and Types:

Manufacturer					
McKinney	WS01	WS02	FS29	FS01	ADH02
Trimco	1270WXCP	1270SVCP	1214H	1211	1261
Rockwood	407	410	481H	441	531

B. Provide wall stop as applicable, for each door leaf. If a wall stop cannot be used, use a floor stop. If neither a wall stop nor a floor stop can be used, provide an overhead stop.

2.9 THRESHOLDS

A. Acceptable Manufacturers: McKinney, Pemko, and Reese Enterprises.

Manufacturer	
McKinney	MCK272A
Pemko	272A

B. Where thresholds are specified in hardware groups, provide MCK272A thresholds unless detailed otherwise.

C. Refer to drawings for special details. Provide accessories, shims and fasteners.

D. Where thresholds occur at openings with one or more mullions, they shall be cut for the mullions and extended continuously for the entire opening.

2.10 WEATHERSTRIPPING

A. Acceptable Manufacturers and Product:

Manufacturer	Sweep	Jamb	Raindrip
McKinney	MCK18061_NB	MCK303_PK	MCK346 _
Pemko	18061 _NB	303_PK	346 _

B. Where weatherstripping is specified in hardware groups, provide MCK303_PK unless detailed otherwise.

C. Provide self-tapping fasteners for weatherstripping being applied to hollow metal frames.

D. Where sweeps are specified in hardware groups, provide MCK18061_NB unless detailed otherwise.

E. Where rain drips are specified in hardware groups, provide MCK346C x full frame width, unless detailed otherwise.

2.11 KEY CABINET

A. Provide key cabinets by Lund Equipment, Telkee Incorporated, or Key Control.

B. Lund Deluxe wall type cabinet, Series 1200.

C. Provide cabinet with one hook for each lock or cylinder plus at least 50 percent extra hooks.

D. Provide each hook with one non-removable security key tag and one snap-on link duplicate key tag.

E. Provide tools, instruction sheets and accessories required to complete installation.

F. Owner will place keys in key cabinet and complete index cards furnished with key system.

2.12 KEY MANAGEMENT SOFTWARE

A. Provide Key Wizard® key management software. Provide a single license version (KW-SS1) or New Masterkey Version (DLKW1) as required.

B. Software shall provide tracking, issuing, collecting and transferring information regarding keys, doors, and hardware.

C. Provide training for Owner's personnel on the proper operation and application of the key management software.

2.13 FASTENERS

A. Including, but not limited to, wood or machine screws, bolts, bolts, nuts, anchors, etc. of proper type, material, and finish required for installation of hardware.

B. Use only manufacturer supplied fasteners to anchor, attach or otherwise install all pieces of hardware.

C. Install all door closers and exit devices with machine screws, whether or not self-tapping (self-drilling) fasteners are offered by the manufacturer. Provide sex bolts (SNB) or through bolts (TB) at all fire rated wood doors unless proper blocking is provided by the door manufacturer.

D. Use phillips head for exposed screws. Do not use aluminum screws to attach hardware.

E. Provide self-tapping (TEC) screws for attachment of sweeps and stop-applied weatherstripping only.

F. Replace all fasteners that have damaged heads due to improper installation methods.

2.14 TYPICAL FINISHES AND MATERIALS

A. Finishes, unless otherwise specified:

1. Butts: Outswinging Exterior Doors:
   a. US32D (BHMA 630) on Stainless Steel

2. Butts: Interior Doors and Inswinging Exterior Doors
   a. S26D (BHMA 652) on Steel

3. Continuous Hinges:
   a. US28 (BHMA 628) on Aluminum

4. Flush Bolts:
   a. US26D (BHMA 626) on Brass or Bronze

5. Exit Devices:
   a. US32D (BHMA 630) on Stainless Steel

6. Locks and Latches:
   a. US26D (BHMA 626) on Brass or Bronze

7. Push Plates, Pulls and Push Bars:
   a. US32D (BHMA 630) on Stainless Steel

8. Coordinators:
   a. USP (BHMA 600) on Steel

9. Kick Plates, Armor Plates, and Edge Guards:
   a. US32D (BHMA 630) on Stainless Steel

10. Overhead Stops and Holders:
    a. US26D (BHMA 626) on Brass or Bronze

11. Closers: Surface mounted.
    a. Sprayed Aluminum Lacquer.

12. Latch Protectors:
    a. US32D (BHMA 630) on Stainless Steel

13. Miscellaneous Hardware:
    a. US26D (BHMA 626) on Brass or Bronze

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine doors, frames, and related items for conditions that would prevent the proper application of finish hardware. Do not proceed until defects are corrected.

3.2 INSTALLATION

A. Prior to commencement of installation of the hardware, there shall be a pre-installation meeting of all installers with the factory representative or other appointed agent of hinges, door closers and exit devices to confirm that all installers are familiar with factory requirements for proper installation of the hardware. If the installers are factory trained and possess a current certification card, the pre-installation meeting is not required.

B. Install finish hardware in accordance with reviewed hardware schedule and manufacturer's printed instructions. Prefit hardware before finish is applied, remove and reinstall after finish is completed. Install hardware so that parts operate smoothly, close tightly and do not rattle.

C. Installation of hardware shall comply with NFPA 80 and NFPA 101 requirements.

D. Set units level, plumb and true to line and location. Adjust and reinforce attachment to 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, forming tight seal between threshold and surface to which set. Securely and permanently anchor thresholds, using countersunk non-ferrous screws to match color of thresholds (stainless steel screws at aluminum thresholds).

3.3 FIELD QUALITY CONTROL

A. After installation has been completed, provide services of qualified hardware consultant to check Project to determine proper application of finish hardware according to schedule. Also check operation and adjustment of hardware items.

B. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

3.4 ADJUSTING AND CLEANING

A. At final completion, hardware shall be left clean and free from disfigurement. Make final adjustment to door closers and other items of hardware. Where hardware is found defective repair or replace or otherwise correct as directed.

B. Adjust door closers to meet opening force requirements of Uniform Federal Accessibility Standards.

C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of space or area, return to work during week prior to acceptance or occupancy, and make final check and adjustment of hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors.

D. Instruct Owner's personnel in proper adjustment and maintenance of door hardware and hardware finishes.

E. Clean adjacent surfaces soiled by hardware installation.

3.5 PROTECTION

A. Provide for proper protection of items of hardware until Owner accepts Project as complete.

3.6 HARDWARE GROUPS

A. The following schedule of hardware groups shall be considered a guide only, and the supplier is cautioned to refer to general conditions, special conditions, and the preamble to this section. It shall be the hardware supplier's responsibility to furnish all required hardware.

3.7 HARDWARE GROUPS

SET #01

1	Continuous Hinge	MCK-12HD	CLEAR	MC
1	Exit Device	43 8504 Less Pull/ Less Cylinder	32D	SA
1	Cylinder	(MATCH OWNER'S STANDARD)	US26D	----
1	Door Pull	OP4513	US32D	MC
1	Closer	PR7500	689	NO
1	Drop Plate	7788	689	NO
1	Wall Stop	WS01 (Convex)	US32D	MC
1	Sweep	MCK18062 CNB		MW
1	Threshold	MCK272A MS&A		MW

NOTE: Seals are furnished by the door supplier.

SET #02

1	Continuous Hinge	MCK-25HD	CLEAR	MC
1	Exit Device	43 LC 8804 x 826	32D	SA
1	Cylinder	(MATCH OWNER'S STANDARD)	US26D	----
1	Closer	PR7500	689	NO
1	Kickplate	KP50 10" X 2" LDW	US32D	MC
1	Wall Stop	WS01 (Convex)	US32D	MC
1	Raindrip	MCK346 C		MW
1	Weatherstrip	MCK303 APK (Head & Jamb)		MW

1	Sweep	MCK18062 CNB		MW
1	Threshold	MCK272A MS&A		MW

SET #03

1	Continuous Hinge	MCK-12HD	CLEAR	MC
1	Push Bar	PB801	US32D	MC
1	Door Pull	OP4513	US32D	MC
1	Closer	PR7500	689	NO
1	Drop Plate	7788	689	NO
1	Door Stop	FS29	US26D	MC

NOTE: Seals are furnished by the door supplier.

SET #04

3	Hinges	TA2714 4 1/2 X 4 1/2	26D	MC
1	Office Lock	LC 8205 LNP	26D	SA
1	Cylinder	(MATCH OWNER'S STANDARD)	US26D	----
1	Wall Stop	WS01 (Convex)	US32D	MC
3	Door Silencers	S1M		MC

SET #05

3	Hinges	TA2714 4 1/2 X 4 1/2	26D	MC
1	Storeroom Lock	LC 8204 LNP	26D	SA
1	Cylinder	(MATCH OWNER'S STANDARD)	US26D	----
1	Wall Stop	WS01 (Convex)	US32D	MC
3	Door Silencers	S1M		MC

SET #06

3	Hinges	TA2714 4 1/2 X 4 1/2	26D	MC
1	Privacy Latch	8265 LNP	26D	SA
1	Closer	7500	689	NO
1	Kickplate	KP50 10" X 2" LDW	US32D	MC
1	Wall Stop	WS01 (Convex)	US32D	MC
3	Door Silencers	S1M		MC

SET #07

3	Hinges	TA2714 4 1/2 X 4 1/2	26D	MC
1	Classroom Lock	LC 8237 LNP	26D	SA
1	Cylinder	(MATCH OWNER'S STANDARD)	US26D	----
1	Closer	7500	689	NO
1	Kickplate	KP50 10" X 2" LDW	US32D	MC
1	Wall Stop	WS01 (Convex)	US32D	MC
3	Door Silencers	S1M		MC

SET #08

3	Hinges	TA2714 4 1/2 X 4 1/2	26D	MC
1	Passage Latch	8215 LNP	26D	SA
1	Wall Stop	WS01 (Convex)	US32D	MC
3	Door Silencers	S1M		MC

SET #09

3	Hinges	TA2714 4 1/2 X 4 1/2	26D	MC
1	Classroom Lock	LC 8237 LNP	26D	SA
1	Cylinder	(MATCH OWNER'S STANDARD)	US26D	----
1	Wall Stop	WS01 (Convex)	US32D	MC
3	Door Silencers	S1M		MC

SET #10

3	Hinges	TA2714 4 1/2 X 4 1/2	26D	MC
1	Push Plate	P053	US32D	MC
1	Door Pull	DP503	US32D	MC
1	Closer	PR7500	689	NO
1	Kickplate	KP50 10" X 2" LDW	US32D	MC
1	Wall Stop	WS01 (Convex)	US32D	MC
3	Door Silencers	S1M		MC

END OF SECTION

SECTION 09110

NON-LOAD BEARING METAL FRAMING SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install complete metal stud wall and furring system as described in Contract Documents.

B. Related Sections
   1. Division 05 - Load-bearing metal framing system

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM C 645-94, "Standard Specification for Non-Load (Axial) Bearing Steel Studs, Runners (Tracks), and Rigid Furring Channels for Screw Application of Gypsum Board"

1.3 SUBMITTALS

A. See Section 01300.

B. Shop Drawings - Show special components and installations not fully dimensioned or detailed in Manufacturer's Product data.

C. Quality Assurance/Control
   1. Manufacturer's technical product data, installation instructions, and recommendations for each component of system.
   2. Mill 'Prime Steel' certifications.
   3. ICBO Evaluation Report

1.4 QUALITY ASSURANCE

A. Regulatory Requirements - ICBO approved.

B. Certifications - Mill certified 'Prime Steel' required.

C. Pre-Installation Meeting
   1. See Section 01200.
   2. Schedule meeting after submittals have been reviewed and returned by Architect, but before beginning metal framng work.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Framing
   1. 20 gauge minimum meeting requirements of ASTM C 645.
   2. Approved Manufacturers -
      a. 20HDS Series by Angeles Metal Systems, Los Angeles, CA (800) 366-6464
      b. 362DS20P by CEMCO, City of Industry, CA (800) 775-2362
      c. Drywall Metal (20 ga only) by Clark Framing Systems, Cincinnati, OH (800) 543-7140
      d. Any member of ML/SFA Division of NAAMM

PART 3 EXECUTION

3.1 INSTALLATION

A. Specifications of Stud Wall Manufacturer shall govern this work unless more stringent requirements are specified below or are detailed on Drawings.

B. Stiffen stud walls with 3/4 inch cold-rolled channels placed horizontally approximately 4 feet from floor and securely attach to each stud. Similarly reinforce door and window openings at headers with reinforcing channel extending 1'6" minimum each side of opening.

C. Wrap multiple, adjacent framing members with duct tape or otherwise secure to eliminate 'chattering.'

D. Use grommets at framing penetrations where unsecured items pass through.

END OF SECTION

SECTION 09130

ACOUSTICAL PANEL SUSPENSION SYSTEM

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install acoustical suspension system as described in Contract Documents to receive acoustical ceiling panels.

B. Related Sections
   1. Division 26 - Light fixtures in ceilings

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM C 635, "Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile & Lay-In Panel Ceilings"
   2. ASTM C 636, "Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile & Lay-In Panels"

1.3 QUALITY ASSURANCE

A. Regulatory Requirements - Meet seismic bracing requirements of IBC.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Systems shall meet requirements of ASTM C 635, Intermediate Duty or Heavy Duty.

B. Exposed surfaces shall be finished with factory-applied white baked enamel.

C. Main runners and cross T's shall have one inch exposed face.

D. Hanger Wire - 12 gauge cold-rolled electro-galvanized steel.

E. Edge Molding - Channel section of cold-rolled electro-galvanized steel.

F. Hold-down Clips - As required by UL to prevent lifting of panels under unusual draft conditions.

G. Design Standards - DX or DXL Systems by USG Interiors

2.2 APPROVED MANUFACTURERS

A. Armstrong World Industries, Lancaster, PA (800) 448-1405
B. Chicago Metallic Corporation, Chicago, IL (800) 323-7164
C. USG Interiors Inc, Chicago, IL (800) 950-3839
D. National Rolling Mills Inc, Malvern, PA (215) 644-6700

PART 3 EXECUTION

3.1 INSTALLATION

A. Work shall be in accordance with Manufacturer's recommendations insofar as they are concerned with Contract Documents. Installation shall meet requirements of ASTM C 636.

B. Lay out suspension system symmetrically about center lines of room unless shown otherwise by Drawings.

C. Leave suspension system in true plane with straight, even joints.

D. Suspension system joints shall be straight and in alignment, and exposed surface flush and level. Wherever system abuts walls, columns, and other vertical surfaces, furnish and install appropriate molding.

E. Locate fixtures symmetrically in room insofar as possible (unless shown otherwise). Locate fixtures within suspension system spaces.

F. Pay particular attention to required hanger wire placement and fixture protection. Individual component deflection not to exceed 1/360 of span.

G. Do not attach suspension system to adjustable folding partition headers.

END OF SECTION

SECTION 09260

GYPSUM WALLBOARD

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install gypsum wallboard as described in Contract Documents.
   2. Furnish and install acoustical sealants as described in Contract Documents.

B. Related Sections
   1. Division 06 -
      a. Backblocking of gypsum wallboard joints
   2. Division 07 - Quality of acoustical sealants

1.2 REFERENCES

A. GA-214 - "Recommended Specification: Levels of Gypsum Board Finish," by following organizations -
   1. Gypsum Association
   2. Painting and Decorating Contractors of America
   3. Ceilings & Interior Systems Construction Association
   4. Association of the Wall and Ceiling Industries International

B. American Society For Testing And Materials
   1. ASTM C 36, "Specification for Gypsum Wallboard"
   2. ASTM C 475, "Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board"
   3. ASTM C 1002, "Specification for Steel Drill Screws for Application of Gypsum Board or Metal Plaster Bases"

1.3 SUBMITTALS

A. See Section 01300.

B. Quality Control - Submit fire test results or assembly diagrams and numbers confirming products used will provide required fire ratings with installation configurations used.

1.4 DELIVERY, STORAGE, & HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name, applicable standard designation, and Manufacturer's name.

B. Store material under roof and keep dry. Stack gypsum board flat and protect from damage.

1.5 PROJECT/SITE CONDITIONS

A. Environmental Requirements
   1. Temperature shall be 50 deg F minimum and 95 deg F maximum day and night during entire joint operation and until execution of Certificate of Substantial Completion.
   2. Provide ventilation to eliminate excessive moisture.
   3. Avoid hot air drafts which will cause too rapid drying.

PART 2 PRODUCTS

2.1 MATERIALS

A. Gypsum Board
   1. For all applications -
      a. Any manufacturer's product meeting requirements of ASTM C 36, tapered edge, face paper suitable for painting.

2.2 ACCESSORIES

A. Metal Accessories
   1. 26 gauge steel, electrolytic galvanized zinc-coated, treated for maximum cement and paint adhesion. Surfaces to receive bedding cement shall be knurled for maximum bonding.
      a. Corner Beads - 1-1/8 inch leg minimum.
      b. Casing - Channel type.
      c. Furring Channels -
         1) Walls - Galvanized USG DWC-25
      d. Resilient Channels - RC-1 by USG
      e. Other accessories as required by Manufacturer's fire tests to provide necessary fire ratings.

B. Joint Compound & Reinforcing
   1. Best grade or type recommended by Wallboard Manufacturer and meeting requirements of ASTM C 475.
   2. Use Taping Compound for first coat to embed tape and Finishing Compound for subsequent coats.

C. Fasteners
   1. Bugle head screws meeting requirements of ASTM C 1002.
      a. Types -
         1) Type W - For fastening gypsum board to wood members other than truss members and plywood web joists.
         2) Type S - For fastening gypsum board to steel framing members, truss members, and plywood web joists.
      b. Lengths -
         1) Of length to penetrate wood framing 5/8 inch minimum.
         2) Of length to penetrate steel framing 3/8 inch minimum.

PART 3 EXECUTION

3.1 INSTALLATION

A. Interface With Other Work - Coordinate with Division 06 for location of backblocking for edges and ends of gypsum board and for blocking required for installation of equipment and building specialties. Do not install gypsum board until required blocking is in place.

B. Fastening
   1. Apply from center of wallboard towards ends and edges.
   2. Apply screws 3/8 inch minimum from ends or edges, one inch maximum from edges, and 1/2 inch maximum from ends.
   3. Space screws not over 7 inches on center at edges where blocking or framing occurs. In panel field, space screws 7 inches on center.
   4. Set screw heads 1/32 inch below plane of board.
   5. Do not break face paper. If face is accidentally broken, apply additional screw 2 inches away.
   6. Screws on adjacent ends or edges shall be opposite each other.
   7. Drive screws with shank perpendicular to face of board.

C. Single Layer Application
   1. Apply ceilings first using minimum of two men.
   2. Use board of length to give minimum number of joints.
   3. On walls over 9 feet high and on ceilings, apply board perpendicular to support.

4. Stagger end joints. End and edge joints of board applied on ceilings shall occur over framing members or be back blocked with 2x4 blocking. End joints of board horizontally applied on walls shall occur over framing members. Edge joints of board vertically applied on walls shall occur over framing members.
5. Butt edges in moderate contact. Do not force in place. Shim to level.
6. Leave facings true with joint, finishing flush. Vertical work shall be plumb and ceiling surfaces level.
7. Scribe work closely. Keep joints as far from openings as possible. if joints occur near an opening, apply wallboard so vertical joints are centered over openings. No vertical joints shall occur within 8 inches of external corners or openings.
8. Install board tight against support with joints even and true. Tighten loose screws.
9. Calk perimeter joints in sound insulated rooms with specified acoustical sealant.

D. Metal Trim
1. Corner Beads - Apply on outside corners with screws spaced 8 inches apart maximum.
2. Trim - Apply where gypsum board abuts dissimilar material in accordance with Manufacturer's instructions. Hold metal trim back from exterior metal window & door frames 1/8 inch to allow for calking.
3. Furring Channels - Apply with screws through flanges into each framing member.

E. Finishing
1. General -
   a. Tape and finish joints as specified below to correspond with final finish material to be applied to gypsum board. When sanding, do not raise nap of gypsum board face paper.
   b. First Coat -
      1) Apply tape over center of joint in complete, uniform bed of taping compound.
      2) Completely fill gouges, dents, and fastener dimples.
      3) Allow to dry and sand lightly if necessary to eliminate high spots or excessive compound.
   c. Second Coat -
      1) Apply coat of finishing compound over embedded tape extending 3-1/2 inches on both sides of joint center.
      2) Re-coat gouges, dents, and fastener dimples.
      3) Allow to dry and sand lightly to eliminate high spots or excessive compound.
   d. Third Coat - Apply same as second coat except extend application 6 inches on both sides of joint center. Allow to dry and sand with fine sandpaper or wipe with damp sponge.
   e. Fourth Coat - Apply same as second coat except extend application 9 inches on both sides of joint center. Allow to dry and sand with fine sandpaper or wipe with damp sponge.
   f. Skim Coat - Apply thin layer of finishing compound to entire surface of panel and immediately shear excess compound, leaving thin film. Eliminate laps and tool marks with fine sandpaper or damp sponge.
2. Finishing Levels -
   a. Unfinished Gypsum Board Surfaces-
      1) GA-214-90 Level Two - "All joints and interior angles shall have tape embedded in joint compound and one separate coat of joint compound applied over all joints, angles, fastener heads, and accessories. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable," except under acoustic tile.
   b. Painted Gypsum Board Surfaces in Storage, & Utility Areas -
      1) GA-214-90 Level Three - "All joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. All joint compound shall be smooth and free of tool marks and ridges."
   c. Painted Gypsum Board Surfaces, Except in Mechanical, Storage, & Utility Areas -
      1) GA-214-90 Level Five - "All joints and interior angles shall have tape embedded in joint compound and three separate coats of joint compound

applied over all joints, angles, fastener heads, and accessories. A thin skim coat of joint compound, or a material manufactured especially for this purpose, shall be applied to the entire surface. The surface shall be smooth and free of tool marks and ridges."

3.2 CLEANING

A. Remove from site debris resulting from work of this Section including taping compound spills.

END OF SECTION

SECTION 09275

GYPSUM BOARD TEXTURED FINISH

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install texturing on ceilings as described in Contract Documents.

B. Related Sections
   1. Section 09 922 - Priming and finish painting

1.2 SUBMITTALS

A. Samples - Provide 2' x 2' control samples for Architect, three samples of each texture described by Architect showing possible variations.

PART 2 PRODUCTS

2.1 MATERIALS

A. Heavy Texture
   1. Approved Manufacturers -
      a. Wall Spray-Spatter Knockdown (non-aggregate) by National Gypsum
      b. Sheetrock Wall & Ceiling Spray Texture (Tuf Tex) by U S Gypsum
      c. Equal as approved by Architect before bidding. See Section 01600.

B. Light Texture
   1. Approved Manufacturers -
      a. Wall Spray-Orange Peel (non-aggregate) by National Gypsum
      b. USG Spray Texture Finish by U S Gypsum
      c. Equal as approved by Architect before bidding. See Section 01600.

2.2 APPROVED MANUFACTURERS

A. National Gypsum, Charlotte, NC (800) 628-4625
B. U S Gypsum Co, Chicago, IL (800) 964-4874
C. Equal as approved by Architect prior to bidding. See Section 01600.

PART 3 EXECUTION

3.1 APPLICATION

A. After gypsum board is taped, sanded, and primed, apply texture in accordance with Manufacturer's directions. Closely match samples accepted by Architect.

END OF SECTION

SECTION 09311

CERAMIC TILE

PART 1 GENERAL

1.1SUMMARY

A.Includes But Not Limited To

1.Furnish and install setting bed as described in Contract Documents

2.Furnish and install cement board backer as described in Contract Documents.

3.Furnish and install ceramic tile, stone thresholds, and stone window stools as described in Contract Documents.

B.Related Sections

1.Division 15 - Floor drains

1.2REFERENCES

A.American Society For Testing And Materials

1.ASTM A 185-90a, "Specification for Metal Welded Steel Wire Fabric for Concrete Reinforcement"

2.ASTM C 144-89, "Specification for Aggregate for Masonry Mortar"

3.ASTM C 150-89, "Specification for Portland Cement"

4.ASTM C 206-84 (1988), "Specification for Finishing Hydrated Lime"

5.ASTM C 207-79 (1988), "Specification for Hydrated Lime for Masonry Purposes"

6.ASTM C 847-88, "Specification for Metal Lath"

7.ASTM D 4397-84 (1989), "Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications"

1.3SUBMITTALS

A.See Section 01300.

B.Product Data

1.Manufacturer's literature for each component of system.

2.Cleaning and maintenance instructions

3.Color and pattern selections

C.Samples - Provide 2' by 2' sample on cement board showing all types of tile, grout, and colors specified for Project. 1/2 of sample board shall show paver tile, 1/4 of board shall show Rest Room floor tile, and 1/4 of board shall show wall tile.

D.Quality Assurance/Control - Master grade certificate.

1.4DELIVERY, STORAGE, & HANDLING

A.Deliver and store packaged materials in their original unopened containers with labels intact until time of use. Store and handle materials in a manner to prevent damage or contamination by water, freezing, or foreign matter.

B.Keep grade seals intact and cartons dry until tile are used.

1.5PROJECT/SITE CONDITIONS

A.Environmental Requirements - Keep area to receive tile work at 50 deg F minimum during preparation of mortar bed, laying of tile, and for 72 hours after completion of tile work.

PART 2 PRODUCTS

2.1MATERIALS

A.Setting Bed
1.Portland Cement - Meet requirements of ASTM C 150, Type 1 (designation shall appear on bag)
2.Hydrated Lime -
a.Meet requirements of one of following -
1) ASTM C 206
2)ASTM C 207, Type S (designation shall appear on bag)
3.Sand - Clean, washed, well-graded, meeting requirements of ASTM C 144 with gradation of 100 percent passing No. 8 sieve with not over 5 percent pass #100 sieve.
4.Metal Reinforcing -
a.Expanded Metal Lath - Meet requirements of ASTM C 847, 2.5 lb minimum expanded metal lath made from galvanized copper bearing steel.
b.Reinforcing Wire Fabric -
1)Reinforcing shall be one of following welded wire fabrics and conform to requirements of ASTM A 185.
a)2" by 2" mesh, W16 by W16 wire.
b)3" by 3" mesh, W12 by W12 wire
c)1-1/2" by 2" mesh, W16 by W12 wire.

B.Cement Board Sheathing
1.Vertical - 7/16 to 1/2 inch thick
2.Horizontal - 1/4 to 5/16 inch thick
3.Approved Manufacturers -
a.Cemroc by Eternit
b.DomCrete by Domtar
c.Util-A-Crete by FinPan
d.Tile Backerboard by Glascrete
e.Durock by U S Gypsum

C.Cement Board Sheathing Fasteners
1.Metal Framing -
a.1-1/4 inch long Tek #3 self-embedding screws
b.1-1/4 inch long RocOn, type-S-point screws
c.1-1/4 inch long DUROCK Steel screws
d.Equal as recommended by Sheathing Manufacturer.
2.Wood Framing -
a.1-5/8 inch long DUROCK Wood screws
b.1-1/4 inch long Rock-On, Hi-Lo type screws
c.Equal as recommended by Sheathing Manufacturer.

D.Cleavage Membrane/Vapor Retarder - 6 mil polyethylene sheeting meeting requirements of ASTM D 4397.

E.Stone Thresholds & Window Stools -
1.Texture and color variation shall be within limits established by Architect's approved sample.
2.Free of defects that would materially impair strength, durability, and appearance.
3.Finish - 80 grit exterior hone.
4.White marble, one piece, 3/4 inch thick
a.Thresholds - 4 inches by door opening width. Cross-section to meet handicap accessibility requirements.

2.2COMPONENTS

A.Tile
1.Tile shall be standard quality, dust-pressed, machine-made, white or off-white body, square or cushion edge, graded in accordance with TCA A137.1-1976.

a.Field tile shall have two lugs on each edge to assure uniform joint, approximately 0.040 inch.
b.External corners shall be standard round.
c.Internal corners shall be square.

2.Rest Room, Font, Drying Area Floor Tile & Font Stair Treads -
a.Unglazed porcelain mosaic. Furnish shower, font, and drying area floors and font stair treads in non-slip, non-abrasive surface.
b.Base shall be 6 inches high coved of white body wall tile composition.
c.Tile Size - 2" by 2" nominal
d.Approved Series, Manufacturers, & Colors -
1)Unglazed Ceramic Mosaics by American Olean
a)Floors & Font Safety Strips - A13 White, A12 Pepper White, A20 Beach Tan
b)Font Stair Treads - 28 Azure Blue/328 CR. Azure Blue
2)Keystone by Dal-Tile
a)Floors & Font Safety Strips - DK-37A White Granite, DK-125 Mont. Light Brown, DK-114 Mont. Light Grey
b)Font Stair Treads - K-159 Vermont Blue/D-129 Sky Blue
3)FTCC Unglazed Mosaics by Florida Tile
a)Floors & Font Safety Strips - 701 Matte White, 702 French Provincial, 719 Pearl, 735 Almond
b)Font Stair Treads - 66 Lt. Vermont Blue/6166 Lt. Vermont Blue

3.Exterior Entry Vestibule, Serving Area Floor Tile -
a.Glaze hardness shall be 8.0 Mohs minimum. Abrasion resistance shall be Class IV minimum.
b.Base shall be of same dense-body composition as field tile.
c.Tile Size - 12" by 12"
d.Color - As selected by Architect.
e.Approved Series & Manufacturers -
1)Triad Series by American Olean Tile
2)Premier Series by Dal-Tile
3)Granite Series by Florida Tile
4)Enviro by KPT Inc

4.Wall, Font Wall, & Ceiling Tile -
a.Glazed tile, cushion edge, white body, lug type.
b.Tile Size - 4-1/4" by 4-1/4"
c.Soap Holders -
1)Flush type
2)6" by 4-1/2" by 2-7/8" or 4-1/4" by 4-1/4" by 2-5/8".
3)Approved Manufacturer - Gilmer Potteries
d.Approved Series, Manufacturers, & Colors -
1)Bright Glaze or Matte Glaze Series by American Olean -
a)Room Walls & Font Walls Above Waterline - 97 Gardenia, 87 Almond
b)Font Below Waterline - 28 Azure Blue/328 CR. Azure Blue
2)Semi-Gloss or Matte by Dal-Tile -
a)Room Walls & Font Walls Above Waterline - D-135 Almond, D-725 Dove, K-166 Tender Gray
b)Font Below Waterline - K-159 Vermont Blue/D-129 Sky Blue
3)Bright Glaze or Matte Glaze Series by Florida Tile -
a)Room Walls & Font Walls Above Waterline - 1 White, 2 French Provincial, 7 Tender Grey, 35 Almond
b)Font Below Waterline - 66 Lt. Vermont Blue/6166 Lt. Vermont Blue

B.Latex-Portland Cement Mortar
1.Ceramic Floor Tile Setting Mortar -
a.Meet requirements of ANSI A118.4 for manufactured mortar, two-part system.
b.Approved Systems & Manufacturers -
1)Tile Mate Dry-Set Mortar with Hydroment Multipurpose Acrylic Latex Mortar Admixture by Bostik
2)Permabond Dry-Set Mortar with C-Crylic 200 Acrylic Admix by C-Cure
3)Custom Thinset Mortar Dry-Set Mortar with Acrylic Mortar Admix by Custom

4)Kerabond Premium Floor & Wall Dry-Set Mortar with Keraply Acrylic Latex Dry-Set Mortar Additive by Mapei
5)Full Set Thin-Set Mortar with Full Bond Latex Additive by TEC

2.Dimensional Stone Setting Mortar -
a.Meet requirements of ANSI A118.4 for manufactured mortar.
b.Approved Systems & Manufacturers -
1)Tile Mate Dry-Set Mortar with Hydroment Multipurpose Acrylic Latex Mortar Admixture by Bostik
2)C-Cure Medium Bed Dry-Set Mortar by C-Cure
3)Custom Medium Bed Dry-Set Mortar with Acrylic Mortar Admix by Custom
4)Ultra/Flor Medium Bed Dry-Set Mortar with Keraply Acrylic Latex Dry-Set Mortar Additive by Mapei

C.Dry-Set Portland Cement Mortar
1.Glazed White Body Wall Tile Setting Mortar
a.Meet requirements of ANSI A118.1 for manufactured mortar.
b.Approved Systems & Manufacturers -
1)Tile Mate by Bostik
2)Permabond by C-Cure
3)Custom Thinset by Custom
4)Kerabond by Mapei
5)Full Set by TEC

D.Commercial Epoxy Grout
1.Color as selected by Architect.
2.Wall Installation - Use additive to specified epoxy grout if recommended by Manufacturer for wall installations with grout joints of 1/8 inch or wider.
3.Approved Systems & Manufacturers -
a.Bonsal Epoxy-Set Epoxy Grout by W R Bonsal
b.Hydroment Colorpoxy by Bostik
c.Latapoxy SP-100 by Laticrete
d.Kerapoxy by Mapei

2.3APPROVED MANUFACTURERS

A.American Olean Tile Co, Lansdale, PA (215) 393-2898
B.Bostik Construction Products, Middleton, MA (800) 726-7845
C.C-Cure Chemical Co Inc, Houston, TX (713) 697-2024
D.Custom Building Products, Bell, CA (310) 598-8808
E.Dal-Tile - Dallas Ceramics, Dallas, TX (800) 933-8453
F.Florida Tile, Lakeland, FL (813) 687-7171
G.Gilmer Potteries, Gilmer, TX
H.KPT Incorporated, Bloomfield, IN (812) 384-3563
I.Laticrete International Inc, Bethany, CT (800) 243-4788
J.Mapei, Elk Grove Village, IL (800) 922-6273
K.TEC Inc, Palatine, IL (800) 323-7407
L.W R Bonsal Co, Charlotte, NC (800) 334-0784

2.4MIXES

	Portland Cement	Dry Sand or Damp Sand	Hydrated Lime*
Floor Mix	1 Part	5 Parts 6 Parts	1/10 Part
Wall Mix	1 Part	- - - - 5-1/2 to 7 Parts	1/2 Part
Font	1 Part**	- - - - 4 Parts	- - - -
Shower Receptors	1 Part**	- - - - 4 Parts	- - - -

* Optional

**Use waterproof cement or waterproofing admixture. Mix dry then add minimum amount of water.

PART 3 EXECUTION

3.1EXAMINATION

A.Before commencing ceramic tilework, inspect surfaces to receive tile and accessories and notify Architect in writing of defects or conditions that will prevent satisfactory tile installation. Installation work shall not proceed until satisfactory conditions are provided.

3.2PREPARATION

A.Allow concrete to cure for 28 days minimum before application of setting bed.

B.Grounds, anchors, plugs, hangers, door frames, electrical, mechanical, and other work in or behind tile shall be installed before tile work is started.

3.3INSTALLATION

A.Site Tolerances

1.Sub-floor Surfaces - 1/8 inch in 10 feet from required plane.

2.Plane of Vertical Surfaces - 1/8 inch in 8 feet from required plane. Shall be plumb and true with square corners.

B.General

1.Install as follows -

a.Use setting bed method on recessed concrete slabs, in Font, and on CMU walls.

b.Use thin set method on cement board on framed walls, framed floors, and ceilings.

c.Use thin set method directly to existing concrete slabs.

2.Center and balance areas of tile if possible.

3.Maintain heights of tilework in full courses to nearest obtainable dimension where heights are given in feet and inches and are not required to fill vertical spaces exactly.

4.Hold cuts to a minimum with no cut pieces smaller than 1/2 tile size unless absolutely necessary. Make cuts on outer edges of field. Smooth cut edges. Install tile without jagged or flaked edges.

5.Fit tile closely where edges will be covered by trim, escutcheons, or similar devices.

6.Splitting of tile is expressly prohibited except where no alternative is possible.

7.Make corners of tile flush and level with corners of adjacent tile, with due allowance to tolerance for tile as specified in ANSI A137.1

8.Keep joint lines straight and of even width, including miters.

9.Thoroughly back-up with thin-set bonding material thin-set trim units, molded, or shaped pieces, and secure firmly in place.

10.Finish floor and wall areas level and plumb with no variations exceeding 1/8 inch in 8 feet from required plane.

11.Accessories in tilework shall be evenly spaced, properly centered with tile joints, and level, plumb, and true to correct projection. Install accessories at locations and heights designated.

12.Finished tilework shall be clean and free of pitted, chipped, cracked, or scratched tiles. Clean in accordance with TCA Specifications.

C.Application to Walls & Ceilings

1.On Setting Bed -

a.Apply vapor retarder to framing.

b.Apply metal reinforcing directly to framing over vapor retarder or directly to CMU.

c.Apply mortar bed to required thickness of 1/2 inch maximum and properly cure before installing tile.

2.On Cement Board Sheathing -

a.Install vapor barrier over framing prior to installing cement board.

b.Install cement board in accordance with Manufacturer's recommendations.

c.Attach board to framing with screws spaced 8 inches on center on walls and 6 inches on center on ceilings. Pre-drill holes in cement board for screws if required by Cement Board

Manufacturer.

d.Shim board so face is flush with adjoining gypsum wallboard and to be plumb and flat or level and flat, depending on location.

e.Tape and fill joints as required by Cement Board Manufacturer.

3.Mix mortar as specified by Manufacturer.

4.Dampen dry backings only as needed to achieve cure. Float mortar with pressure over an area no greater than can be covered with tile while mortar remains plastic. Cover evenly with no bare spots. Comb mortar with notched trowel of type recommended by Manufacturer ten minutes maximum before applying tile. Do not apply tile to skinned-over mortar. Finished setting bed thickness, 3/32 to 1/8 inch thick after beating-in.

5.Press glazed tile firmly into freshly notched mortar. Tap and beat to a true surface. Determine joint width by spacers on tile or by strings or pegs if tile without spacers are used. Press and beat tile into place to obtain at least 80 percent coverage by mortar on back of each tile except for tile in showers where coverage shall be 100 percent.

D.Application to Floors & In Font

1.On Setting Bed - Apply mortar bed 3/4 inch thick minimum at floor drain to maximum depth equal to depression in slab minus 1/2 inch. Properly cure before installing tile.

2.On Cement Board Sheathing -

a.Install vapor barrier over floor prior to installing cement board.

b.Install cement board in accordance with Manufacturer's recommendations.

c.Attach board through subfloor into framing with screws spaced 8 inches on center. Pre-drill holes in cement board for screws if required by Cement Board Manufacturer.

d.Tape and fill joints as required by Cement Board Manufacturer.

3.Clean base surface thoroughly. Dampen if very dry, but do not saturate.

4.Float mortar over area no greater than can be covered with tile while mortar remains plastic. Cover evenly with no bare spots. Comb mortar with notched trowel of type recommended by Manufacturer within ten minutes of applying tile.

5.Insert temporary filler in expansion and control joints.

6.Finished setting bed thickness 3/32 inch to 1/8 inch thick with thinset mortar and 3/16 to 3/4 inch thick with medium bed mortar after beating in.

7.Press tile firmly into freshly notched mortar. Beat-in and adjust tile before initial set takes place.

8.Press and beat tile into position to obtain 100 percent contact with mortar bed with no voids in mortar. Obtaining 100 percent contact with rib-backed tile may require troweling mortar layer on back of each tile prior to placing on mortar bed.

9.Install safety strip consisting of one course of tile at the nose of each stair tread below the waterline.

E.Grouting of Tile

1.Firmly set tile before grouting. This requires 48 hours minimum.

2.Remove spacers or ropes before grouting.

3.Remove glue from face-mounted tile before grouting.

4.Using grout of type and mix specified, force grout into joints using hard rubber grouting trowel or other suitable tool recommended by Grout Manufacturer. Use sufficient pressure and flow grout in progressively to avoid air pockets and voids.

5.Fill joints full. Fill joints of cushion edge tile to depth of cushion. Fill joints of square edge tile flush with surface.

6.Remove excess grout from surface of tile with squeegee or rubber trowel before it loses its plasticity or begins to set. Follow Grout Manufacturer's recommendations for final clean-up.

7.Finished grout shall be uniform in color, smooth, and without voids, pin holes, or low spots, and tile shall be clean.

F.Curing - Keep installation at 65 to 85 deg F during first 8 hours of cure. Shade area completely from sun during this period.

3.3PROTECTION

A.Close to traffic spaces in which tile is being set and other tile work being done. Keep closed until tile is firmly set. Before, during, and after grouting, keep area clean, dry, and free from foreign materials and air flow

which will interfere with setting and curing of grout.

B. Newly tiled floors shall not be walked on nor worked on without using kneeling boards or equivalent protection of tiled surface.

END OF SECTION

SECTION 09511

ACOUSTICAL PANEL CEILINGS

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install tile for suspended acoustical ceilings as described in Contract Documents.

B. Related Sections
   1. Section 09130 - Acoustical Panel Suspension System

1.2 SUBMITTALS

A. See Section 01300.

B. Product Data
   1. Manufacturer's literature
   2. Color and pattern selection

1.3 DELIVERY, STORAGE, & HANDLING

A. Store materials where protected from moisture and damage.

B. Use no soiled, scratched, or broken material in the Work.

1.4 MAINTENANCE

A. Extra Materials - Provide Owner with one carton of each type of tile for future use.

PART 2 PRODUCTS

2.1 MATERIALS

A. Acoustic Panels
   1. Cast panels, core color to match surface color.
   2. Finish - Use tile from same color run in individual rooms to assure color match.
   3. Rating - Match UL fire-resistance classification of suspension system.
   4. Thickness - 3/4 inch minimum
   5. Approved Patterns & Manufacturers -
      a. 9 Feet & Below -
         1) Natural Fissured by Celotex, Tampa, FL (813) 873-1700
         2) "F" Fissured by USG Interiors, Chicago, IL (800) 950-3839
      b. Above 9 Feet -
         1) Texture-Tone by Celotex, Tampa, FL (813) 873-1700
         2) Glacier by USG Interiors, Chicago, IL (800) 950-3839

PART 3 EXECUTION

3.1 EXAMINATION

A. Inspect for defects in support which are not acceptable. Report defects to Architect in writing. Do not install ceiling panels until defects in support are corrected.

3.2. INSTALLATION

A. Materials shall be dry and clean at time of application.

B. Install lay-in panels in accordance with Manufacturer's instructions.

3.3 CLEANING

A. "Touch-up" minor abraded surfaces.

B. Remove from site all debris connected with work of this Section.

C. Remove and replace discolored tile to match adjacent tile.

D. Remove and replace damaged or out-of-level tile at no additional cost to Owner.

END OF SECTION

SECTION 09660

RESILIENT TILE FLOORING

PART 1 GENERAL

1.1SUMMARY

A.Includes But Not Limited To

1.Furnish and install resilient tile flooring as described in Contract Documents.

1.2SUBMITTALS

A.See Section 01300.

B.Product Data

1.Manufacturer's literature or cut sheet on each component of system

2.Maintenance instructions

3.Color and style selection

1.3QUALITY ASSURANCE

A.Environmental Conditions - Maintain 70 deg F minimum during application.

1.4MAINTENANCE

A.Extra Materials - Leave box of 20 extra tile of each pattern and color used on Project with Owner.

PART 2 PRODUCTS

2.1MATERIALS

A.Reinforced Vinyl Tile

1."Marbleized" or "Thru-chip" Pattern 1/8" by 12" by 12". Do not furnish tile which does not have its pattern and color extended continuously through entire thickness.

2.Meet or exceed Fed Spec SS-T-312b, Type IV.

3.Colors - To be selected by Architect.

4.Approved Manufacturers -

a.Architectural Series by Kentile, Brooklyn, NY (908) 757-8953

b."Vina-Lux" by Azrock Floor Products, San Antonio, TX (210) 558-6400

c.Vinyl Plastics Inc VPI, Sheboygan, WI (800) 874-4240

d.Equals as approved by Architect before bidding. See Section 01600.

B.Adhesive - Water-resistant type. Best grade in accordance with Manufacturer's recommendations.

PART 3 EXECUTION

3.1INSTALLATION

A.Lay tile symmetrically about center line of spaces to insure even borders unless shown differently on Drawings.

B.Install beveled edge stripping at terminal edges of tile except at ceramic tile, carpet, and where Drawings indicate different detail. Conceal edging strips beneath doors.

END OF SECTION

SECTION 09 681

FLOOR PREPARATION FOR CARPET INSTALLATION

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Prior to and during installation of carpet, prepare floor and maintain environmental conditions as described in Contract Documents.
   2. Perform minor alterations to building to accommodate carpet as described in Contract Documents.

1.2 SUBMITTALS

A. See Section 01 300.

B. Product Data
   1. Manufacturer's literature and installation instructions for floor patching compound and latex underlayment.

1.3 QUALITY ASSURANCE

A. Pre-Installation Meeting
   1. See Section 01 200.
   2. Schedule meeting -
      a. Prior to completing work of this Section.
      b. 2 weeks minimum prior to carpet installation.
   3. Review condition of floor in regard to compliance with installation tolerances, required patching, cleanliness requirements, and other work necessary to prepare floors for installation of carpet.
   4. Review portions of building that are to be removed or altered to accommodate carpet installation.

B. All work to be performed in compliance with SUU Facilities Management General Standards.

1.4 PROJECT/SITE CONDITIONS

A. Environmental Conditions
   1. Maintain 65 deg F minimum and 95 deg F maximum for 7 days prior to laying of carpet, continuously during installation period, and for 3 days after completion of installation.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions are ready for the installation of the carpet.

3.2 PREPARATION

A. Building Modifications
   1. If necessary, cut off doors in areas to receive new carpet so they clear carpet by 1/2

inch.

B. Floor Preparation
   1. General -
      a. Remove paint, sealer, grease, oil, silicone sealants, old carpet and adhesive, and other materials incompatible with carpet adhesive.
   2. Patch cracks, holes, and irregularities with specified material to provide a smooth, level surface.

3.3 FIELD QUALITY CONTROL

A. Testing
   1. Owner reserves right to field test floor preparation and reinstallation of furniture for specification compliance.

END OF SECTION

SECTION 09690

CARPET TILE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Carpet tiles.

B. Accessories.

1.2 REFERENCES

A. ASTM D2859 - Test Method for Flammability of Finished Textile Floor Covering Materials.

B. ASTM E84 - Surface Burning Characteristics of Building Materials.

C. ASTM E648 - Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.

D. NFPA 253 - Test for Critical Radiant Flux of Floor Covering Systems.

E. Carpet tile to comply with SUU Facilities Management General Standards.

1.3 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.

1.4 QUALIFICATIONS

A. Installer: Company specializing in performing the work of this Section with minimum 3 years documented experience.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Store materials for 3 days prior to installation in area of installation, to achieve temperature stability.

B. Maintain minimum 70 degrees F (21 degrees C) ambient temperature three days prior to, during and 24 hours after installation materials.

1.6 MAINTENANCE DATA

A. Submit under provisions of Section 01700.

B. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

1.7 EXTRA MATERIALS

A. Furnish under provisions of Section 01700.

B. Provide 10 % of the total square footage of carpet tiles of each color and pattern selected.

PART 2 PRODUCTS

2.1 MANUFACTURERS - CARPET TILE

A. As approved by SUU Facilities Management.

2.2 CARPET TILE

A. As approved by SUU Facilities Management.

2.3 ACCESSORIES

A. Sub-Floor Filler: type recommended by flooring material manufacturer.

B. Primers and Adhesives: Recommended by carpet manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are smooth and flat with maximum variation of 1/4 inch in 10 ft, and are ready to receive work.

3.2 PREPARATION

A. Remove subfloor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler.

B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

C. Vacuum clean substrate.

3.3 INSTALLATION

A. Install carpet tile, accessories and adhesive in accordance with manufacturer's instructions.

B. Integrate and blend carpet from different cartons to ensure minimal variation in color match.

C. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.

D. Locate change of color or pattern between rooms under door centerline.

E. Place carpet tile dry over substrate.

F. Extend carpet tile as base finish up vertical surfaces to form base. Terminate top of base with cap strip.

3.4 CLEANING

A. Clean work under provisions of 01700.

B. Remove excess adhesive without damage, from floor, base, and wall surfaces.

C. Clean and vacuum carpet surfaces.

3.5 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Section 01500.

B. Do not permit traffic over unprotected floor surface.

END OF SECTION

SECTION 09901

GENERAL PAINTING REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Finishing elements of the building shown on Finish Schedule or specified below.
   2. Finish work to be installed under Section 06201. Back prime work to be installed against concrete or masonry or subjected to moisture.

1.2 SUBMITTALS

A. See Section 01300.

B. Product Data
   1. Submit Manufacturer's literature marked to indicated primer and finish coat products to be used. Provide Manufacturer's cut sheets for each primer and finish coat which indicate paint components and percentages.
   2. Maintenance instructions
   3. Color schedule
   4. Maintain copy of submission on Project site.

C. Samples - Provide paint card for each color and for each paint system. Card to show each component of system as well as total system.

1.3 QUALITY ASSURANCE

A. Field Samples
   1. Before application of any paint system, if required by Architect, meet on Project site with Architect, Owner's representative, and Manufacturer's representative. Architect may select one surface for application of each paint system specified.
   2. Apply paint systems to surfaces indicated by Architect following procedures outlined in Contract Documents and Product Data submission specified above.
   3. After approval of samples, proceed with application of paint system throughout Project.

B. Pre-Installation Meeting
   1. See Section 01200.
   2. Schedule meeting after delivery of paint but prior to application of field samples or paint.

1.4 DELIVERY, STORAGE, & HANDLING

A. Deliver specified products in original containers with labels intact on each container. Deliver amount of material indicated on submittal for Project in single shipment. Notify Architect two working days prior to delivery of paint.

B. Store materials in single place.

C. Keep storage area clean and rectify any damage to area at completion of work of this Section.

1.5 PROJECT/SITE CONDITIONS

A. Environmental Conditions
   1. Maintain temperature of paint storage area at 55 deg F minimum.
   2. Perform painting operations at temperature conditions recommended by Manufacturer for each operation.

1.6 SCHEDULING

A. Coordinate with other Sections for work that requires painting prior to installation.

B. Examine Contract Documents for painting requirements of other trades. Become familiar with their painting provisions and the painting of finish surfaces left unfinished by the requirements of other Sections.

1.7 MAINTENANCE

A. Extra Materials - Provide one quart of each finish coat material in Manufacturer's original container in each color used.

PART 2 PRODUCTS

2.1 MATERIALS

A. Linseed oil, shellac, turpentine, and other painting materials shall be pure, of highest quality, and bear identifying labels on containers.

B. Paint compositions shall not only meet specified requirements but also contain sufficient miscellaneous components to promote proper drying and performance during and after application.

2.2 APPROVED MANUFACTURERS

A. Benjamin Moore, Montvale, NJ (800) 445-3671
B. Devoe & Raynolds, Louisville, KY (800) 654-2616
C. Fuller O'Brien, South San Francisco, CA (800) 546-1112 ext 3128
D. Guardsman, Seattle, WA (800) 325-3904
E. Lilly, Indianapolis, IN (317) 687-6705
F. Pittsburgh Paints, Pittsburgh, PA (800) 441-9695
G. Pratt & Lambert, Marysville, CA (800) 289-7728
H. Sherwin-Williams, Cleveland, OH (800) 321-8194
I. United Gilsonite Laboratories, Scranton, PA (717) 344-1202
J. Wm. Zinsser & Co, Somerset, NJ (908) 469-8100

PART 3 EXECUTION

3.1 ACCEPTABLE APPLICATORS

A. Applicator shall have experience in application of specified products for five years minimum and be acceptable to Architect and Manufacturer.

3.2 PREPARATION

A. Protection
   1. Remove all oily rags and waste from building each night. Take every precaution to avoid danger of fire.
   2. Protect finish work and adjacent materials during painting. Do not splatter, drip, or paint surfaces not intended to be painted. These items will not be spelled out in detail but pay special attention to the following -
      a. Do not paint finish copper, bronze, chromium plate, nickel, stainless steel, anodized aluminum, or monel metal except as explicitly specified.
      b. Keep cones of ceiling speakers completely free of paint. If it is required that metal speaker grilles are to be painted, paint prior to mounting grilles to speakers. Mask off metal grilles installed on ceiling speakers if ceiling is being spray painted.

B. Surface Preparation
   1. Surfaces to be painted shall be clean and free of loose dirt. Clean and dust surfaces before painting or finishing.
   2. Do no exterior painting while surface is damp, unless recommended by Manufacturer, nor during rainy or frosty weather. Interior surfaces shall be dry before painting.
   3. Wash metal surfaces with mineral spirits to remove dirt and grease before applying materials. Where rust or scale is present, use wire brush or sandpaper to clean before painting. Clean shop coats of paint that have become marred and touch up with proper type primer.
   4. Treat galvanized metal and zinc surfaces as specified and in accordance with Manufacturer's directions before applying first paint coat.
   5. Sand woodwork smooth with 220 sandpaper and clean surfaces before proceeding with stain or first coat application.
   6. Fill holes and cracks in surfaces to receive paint or stain.

3.3 APPLICATION

A. Carefully follow Specifications and color schedule, painting complete all surfaces to be painted.

B. Tint priming coat and undercoat to approximate shade of final coat, but with enough difference so it is possible to check application of specified number of coats.

C. Spread materials smoothly and evenly.

D. Putty nail holes in wood after application of first finish coat using natural colored type to match wood finish. Bring putty flush with adjoining surfaces.

E. Touch up suction spots after application of first coat.

F. Paint shall be thoroughly dry and surfaces clean before applying succeeding coats.

G. Use fine sandpaper between coats as necessary to produce even, smooth surfaces.

H. Make edges of paint adjoining other materials or colors clean, sharp, and without overlapping.

I. Finished work shall be uniform, of approved color, smooth, and free from runs, sags, defective brushing, rolling, clogging, and excessive flooding.

3.4 ADJUSTMENT

A. At completion of Project, touch up work to match specified finish. Repaint areas damaged during construction with specified finish at no additional cost to Owner.

3.5 CLEANING

A. Do not discard paint containers without Architect's written approval to allow count to determine if paint delivered was applied.

B. Upon completion of work of this Section, remove paint spots from floors, walls, glass, or other surfaces and leave work clean, orderly, and in acceptable condition. Remove debris caused by work of this Section from premises.

END OF SECTION

SECTION 09922

PAINT ON INTERIOR GYPSUM WALLBOARD

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Preparing, priming, and finish painting new interior gypsum wallboard surfaces as described in Contract Documents.

B. Related Sections
   1. Section 09901 - General Painting Requirements

1.2 SEQUENCING

A. Properly clean and paint light cove interiors before installation of light fixtures.

PART 2 PRODUCTS

2.1 APPROVED MANUFACTURERS

A. Wallboard
   1. Benjamin Moore -
      a. First Coat - Latex Quick Dry Prime Seal 201
      b. Second & Third Coats - Regal Aquaglo 333
   2. Devoe -
      a. First Coat - 50801 Interior Latex Primer-Sealer
      b. Second & Third Coats - 525XX Mirrolac Water-borne Semi-Gloss
   3. Fuller O'Brien -
      a. First Coat - 220-22 PVA Primer
      b. Second & Third Coats - 214-XX Latex Semi-Gloss Enamel
   4. Pittsburgh Paints -
      a. First Coat - 6-2 SpeedHide Quick Dry Primer
      b. Second & Third Coats - 6-510 Interior High Lustre S/G
   5. Pratt & Lambert -
      a. First Coat - Z-96 Wall Primer
      b. Second & Third Coats - Aqua-Satin Latex Enamel
   6. Sherwin-Williams -
      a. First Coat - ProMar 200 Latex Primer B28 W200
      b. Second & Third Coats - ProMar 200 Latex Semi-Gloss

B. Paint Colors
   1. As identified in the construction drawings.

PART 3 EXECUTION

3.1 APPLICATION

A. Interface With Other Work.

B. New Work
   1. See appropriate paragraphs of Section 09901.
   2. Primer -
      a. Apply primer to be covered with paint coats with roller only, or with spray gun and back-rolled.

C. Existing Work
   1. Clean surface with soft cloth dampened with thinner.

2. Spackle and tape cracks. Sand to smooth finish.
3. Sand or chemically etch as required to prepare surface to accept new paint.
4. Clean surface with soft cloth dampened with thinner.
5. Prime.
6. Apply finish coats.

END OF SECTION

SECTION 09 936

CLEAR FINISH ON INTERIOR HARDWOOD

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Preparing and finishing of new interior clear finished hardwood as described in Contract Documents.

B. Related Sections
   1. Section 09 901 - General Painting Requirements
   2. Division 08 - Factory finished flush wood doors.

1.2 QUALITY ASSURANCE

A. Field Samples
   1. Prior to performing work of this Section, prepare control sample, to match sample available from Architect, to be used as finishing standard for interior clear finished hardwood.
   2. Finish applicator shall attend progress meeting held prior to preparation of control sample. Architect will review requirements to insure that control sample will be prepared using specified products and procedures.
   3. Control sample shall consist of standard flush door intended for installation in Project.
   4. Architect will inspect control sample at progress meeting following preparation of control sample. When sample is approved, work of this Section may proceed.

PART 2 PRODUCTS

2.1 APPROVED MANUFACTURERS

A. Dye / Stain
   1. As approved by SUU Facilities Management.

B. Finish Coats - clear
   1. Devoe -
      a. First Coat - 59120 Vinyl Sealer
      b. Second & Third Coats - 591XX Pre-Catalyzed Lacquer
   2. Guardsman -
      a. First Coat - 14-7074 Pre-Catalyzed Lacquer Sealer
      b. Second & Third Coats - 14-7075 Pre-Catalyzed Lacquer
   3. Lilly -
      a. First, Second, & Third Coats - 20 Sheen Pre-Catalyzed Lacquer 587E208
   4. Reliance -
      a. First Coat - 421-CO2O-99 Non-Stearated Sanding Sealer
      b. Second & Third Coats - 33035FO20 Pre-Catalyzed Lacquer
   5. Pratt & Lambert / M.L.Campbell
      a. First Coat - C101-83 Vinyl Sealer
      b. Second & Third Coats - C112-204 Pre-Catalyzed Lacquer.
   6. Sherwin-Williams -
      a. First Coat - T67F3 Vinyl Sealer
      b. Second & Third Coats - T77F33 D.R.E. Catalyzed Lacquer. Catalyst to be added by supplier.

PART 3 EXECUTION

3.1 APPLICATION

A. New Work
   1. See appropriate paragraphs of Section 09 901.
   2. Surfaces shall be clean and dry.
   3. Sand entire surface item to be finished lightly with 120 to 150 non-stearated sandpaper and clean before applying dye or stain.
   4. Apply dye/stain in accordance with Manufacturer's recommendations and as necessary to attain correct color.
   5. Scuff sand with 220 stearated sandpaper between application of first and second coats.
   6. Make certain surfaces are dry before applying next coat.
   7. Where backpriming is required, apply one coat of finish material.
   9. Finishing of Door Surfaces, Including Edges, Faces, Tops, & Bottoms -
      a. Apply finish as soon as door is fitted. Finish tops, bottoms, and edges before faces. Finish and refinish doors with no hardware applied to doors.

END OF SECTION

SECTION 10810

TOILET ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. Products Supplied But Not Installed Under This Section
   1. Accessories for Rest Rooms

B. Related Sections
   1. Division 06 -
      a. Installation
      b. Blocking
   2. Soap dispensers and paper towel dispensers to match existing units per SUU Facilities Management.

1.2 SUBMITTALS

A. See Section 01300.

B. Product Data - Manufacturer's literature or cut sheets

C. Shop Drawings - Submit schedule showing items used, location where installed, and proper attaching devices for substrate.

PART 2 PRODUCTS

2.1 MANUFACTURED UNITS

A. Rest Rooms
   1. Toilet Tissue Dispensers, Sanitary Napkin Disposal Container, Single Robe Hook with Exposed Fasteners, Mirrors, and Grab Bars as identified in the construction documents.
   2. Or approved equal.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install items in accordance with Manufacturer's instructions. Provide mounting devices proper for base structure.

B. Where possible, mount like items in adjoining compartments back-to-back on same partition.

C. Locate as follows
   1. Toilet Tissue Dispenser - One at each water closet.
   2. Sanitary Napkin Disposal Containers - One at each water closet in Women's Rest Rooms and unisex handicapped Rest Rooms.
   3. Robe Hook -
      a. One on partition panel or building wall, depending on compartment configuration, within one foot of compartment door jamb and at same height as compartment latch in handicap stalls.
      a. One on building wall within one foot of door jamb and at same height as door lockset in Women’s Handicap Rest Room.

END OF SECTION

SECTION 13352

DUCT TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Test, balance, and adjust air duct systems as described in Contract Documents.

B. Related Sections:
   1. Division 15:
      a. Completing installation and start-up of mechanical systems, and changing sheaves, belts, and dampers as required for correct balance.
      b. Assisting Balancing Agency in testing and balancing of mechanical system.

1.2 SYSTEM DESCRIPTION

A. Performance Requirements:
   1. Perform testing and balancing in complete accordance with Associated Air Balance Council Standards for Field Measurement & Instructions, Form P1266, Volume I. Record test data on AABC standard forms or facsimile.
   2. Noise level shall not exceed PNC 30 when all mechanical equipment is operating.

1.3 SUBMITTALS

A. Quality Assurance / Control:
   1. Four copies of complete test data for evaluation and approval.
   2. Test And Balance Report:
      a. Complete with logs, data, and records as required herein. Print logs, data, and records on white bond paper bound together in report form.
      b. Certified accurate and complete by Balancing Agency's certified test and balance engineer.
      c. Contain following general data in format selected by Balancing Agency.
         1) Project Number.
         2) Project Title.
         3) Project Location.
         4) Project Architect and Mechanical Engineer.
         5) Test and Balance Agency and Certified Engineer.
         6) Contractor and mechanical sub-contractor.
         7) Dates tests were performed.
         8) Certification Document.
         9) Report Forms similar to AABC Standard format.
      d. Report shall include following:
         1) Preface suggesting abnormalities and problems encountered.
         2) Instrumentation List including type, model, manufacturer, serial number, and calibration dates.
         3) System Identification reporting location of zones, supply, return, and exhaust openings.
         4) Record following for each piece of air handling equipment:
            a) Manufacturer, model number, and serial number.
            b) Design and manufacturer rated data.
            c) Actual CFM.
            d) Suction and discharge static pressure of each fan.
            e) Outside-air and return-air total CFM.
            f) Actual operating current, voltage, and brake horsepower of each fan motor.

g) Final RPM of each motor.
h) Fan and motor sheave manufacturer, model, size, number of grooves and center distance.
i) Belt size and quantity.
j) Static-pressure controls final operating set points.

3. Bind approved copy of report in Operations And Maintenance Manual for Division 15.

1.4 QUALITY ASSURANCE

A. Qualifications:
1. Work of this Section shall be performed by independent Air Testing And Balance Agency specializing in testing and balancing of heating, ventilating, and cooling systems to balance, adjust, and test air moving equipment, air distribution, and exhaust systems.
2. Agency shall provide proof of having successfully completed at least five years of specialized experience in air and hydronic system balancing. Work by this Agency shall be done under direct supervision of qualified heating and ventilating engineer employed by Agency.
3. Agency shall be approved in writing by Architect.
4. Neither Architect's engineering consultant or anyone performing work on this Project under Division 15 shall be permitted to do this work.

1.5 SCHEDULING

A. Award test and balance subcontract to Agency upon receipt of Notice To Proceed to allow Agency to schedule this work in cooperation with other Sections involved and to comply with completion date.

B. During construction, Agency shall inspect installation of pipe systems, sheet metal work, temperature controls, and other component parts of mechanical systems. Perform inspections as follows.
1. One inspection when 60 percent of ductwork is installed.
2. One inspection when 90 percent of equipment is installed.

C. Do not begin air testing and balancing until:
1. After completion of air cooling, heating, and exhaust systems including installation of specialties, devices, and new filters.
2. Proper function of control system components including electrical interlocks, damper sequences, air and water reset, and fire and freeze stats has been verified.
3. Automatic temperature controls have been calibrated and set for design operating conditions.
4. Verification of proper thermostat calibration and setting of control components such as static pressure controllers and other devices that may need set points changed during process of balancing system.

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

3.1 PREPARATION

A. Heating, ventilating, and cooling systems and equipment shall be in full operation and continue in operation during each working day of testing and balancing.

3.2 FIELD QUALITY CONTROL

A. Site Tests:
1. If requested, conduct tests in presence of Architect.

2. Instruments used by Agency shall be accurately calibrated and maintained in good working order.
3. Air Testing And Balancing Procedure:
    a. Perform tests at high and low speeds of multi-speed systems and single speed systems. Perform following testing and balancing functions in accordance with Associated Air Balance Council National Standards:
        1) Fan Speeds: Test and adjust fan RPM to achieve design CFM requirements.
        2) Current and Voltage: Measure and record motor current and voltage.
        3) Pitot-Tube Traverse: Perform pitot-tube traverse of main supply and return ducts to obtain total CFM.
        4) Outside Air: Test and adjust system minimum outside air by pitot-tube traverse.
        5) Static Pressure: Test and record system static pressures, including suction and discharge static pressure of each fan.
        6) Air Temperature: Take wet and dry bulb air temperatures on entering and leaving side of each cooling coil. Dry bulb temperatures shall be taken on entering and leaving side of each heating unit.
        7) Main Ducts: Adjust main ducts to within design CFM requirements and traverse for total CFM quantities.
        8) Branch Ducts: Adjust branch ducts to within design CFM requirements. Multi-diffuser branch ducts shall have at least one outlet or inlet volume damper completely open.
        9) Tolerances: Test and balance each diffuser, grille, and register to within 10 percent of design requirements.
        10) Identification: Identify the location and area of each grille, diffuser, and register. Record on air outlet data sheets.
        11) Description: Record size, type, and manufacturer of each diffuser, grille, and register on air outlet data sheets.
        12) Drafts: Adjust diffusers, grilles, and registers to minimize drafts.
    b. Permanently mark all outside air, supply air, and return air damper positions after balancing has been completed.
4. Smoke testing, or some other approved means, may be required to determine leak locations if air balance report indicates that any system's CFM total is less than 10 percent of design CFM. Prior to test, verify that system's duct joints have been sealed as specified and that air moving device in question is supplying required design system air flow. Architect will approve test method required. If smoke test is selected, use following procedure. Provide necessary precautions to protect those performing or observing test from being exposed to smoke.
    a. Use zinc chloride smoke candles, titanium tetrachloride ampules or sticks, or other devices acceptable to Architect to generate smoke.
    b. Close openings in duct except for one opening at farthest end of duct run.
    c. Circulate smoke at pressurized condition of 1/2 inch minimum water gauge static pressure.
    d. Report findings to Architect in writing.

B. Final Inspection And Adjustments:
1. System shall be balanced and reports submitted to Architect before final inspection.
2. Balancing Agency shall be represented at final inspection meeting by qualified testing personnel with balancing equipment and two copies of air balancing test report.
    a. Architect will choose and direct spot balancing of one zone. Differences between the spot balance and test report will be justification for requiring repeat of testing and balancing for entire building. If recheck testing demonstrates measured flow deviation of 10 percent or more from recorded information on report, report will be rejected and new inspection and report will be made and resubmitted.
    b. Perform re-balancing in presence of Architect and subject to its approval.
    c. If re-balancing is required, submit revised air test and balance reports to Architect before Substantial Completion.
    d. Spot balance and rebalance shall be performed at no additional cost to Owner.
3. Where furnace supplied to job site provides over 5 percent more air than schedule requirements, rooms supplied by that furnace shall have their supply air quantities increased by ratio of actual total air quantity supplied to minimum air quantity required by furnace schedule.

END OF SECTION

SECTION 13930

WET-PIPE FIRE-SUPPRESSION SPRINKLERS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install complete wet-pipe fire sprinkler system as specified in Contract Documents.

B. Products Installed But Not Supplied Under This Section:
   1. Firestopping

C. Related Sections:
   1. Section 02513: Site Fire Protection.
   2. Section 07840: Quality of Firestopping.
   3. Section 13851: Alarm And Detection System including connection of tamper switches and pressure flow detectors to alarm system and furnishing and installing of low temperature switch.

1.2 REFERENCES

A. American National Standards Institute / American Society of Mechanical Engineers:
   1. ANSI / ASME B 16.1-89, 'Cast Iron Pipe Flanges and Pipe Flanged Fittings.'
   2. ANSI / ASME B 16.3-85, 'Malleable Iron Threaded Fittings, Classes 150 and 300.'
   3. ANSI / ASME B 16.4-89, 'Cast Iron Threaded Fittings, Class 125 and Class 250.'

B. American National Standards Institute / National Fire Protection Association:
   1. ANSI / NFPA 13-2002, 'Installation of Sprinkler Systems.'

C. American Society For Testing And Materials:
   1. ASTM A 53-00, 'Standard Specification for Pipe, Steel and Hot-Dipped, Zinc-Coated, Welded and Seamless.'
   2. ASTM A 234-00a, 'Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperature Service.'
   3. ASTM A 536-84 (1999), 'Standard Specification for Ductile Iron Castings.'

D. American Water Works Association:
   1. AWWA C-606,

1.3 SUBMITTALS

A. Shop Drawings:
   1. Size sprinkler system by one of following methods:
      a. Pipe schedule method in accordance with ANSI/NFPA 13.
      b. Hydraulic calculation design method based on water supply evaluation performed at building site.
      c. On submittals, refer to sprinkler heads by sprinkler identification or model number published in appropriate agency listing or approval. Trade names and other abbreviated designations are not acceptable
   2. Submittal Procedure:
      a. After award of Contract and before purchase of equipment, submit seven sets of shop drawings with specifications and hydraulic calculations, if pipe schedule method is not used, to Architect and two sets to local jurisdiction having authority for fire prevention for review.

b. After integrating Architect's and AHJ's comments into drawings, licensed certified fire protection engineer of record submitting fire sprinkler system design construction documents shall stamp, sign, and date each sheet of shop drawings and first page of specifications and calculations.
c. Submit stamped documents to Owner and to AHJ for fire prevention for final approval.
d. After final approval, submit four copies of approved stamped documents to Architect.
e. Failure of system to meet requirements of authority having jurisdiction shall be corrected at no additional cost to Owner.

B. Closeout:
1. Operation And Maintenance Manual Data:
a. Modify and add to requirements of Section 01700 as follows:
1) Provide master index showing items included.
2) Provide name, address, and phone number of Architect, Architect's Fire Sprinkler Consultant, General Contractor, and Fire Protection subcontractor.
3) Provide operating instructions to include:
a) General description of fire protection system.
b) Step by step procedure to follow in putting system into operation.
4) Maintenance instructions shall include:
a) List of system components used indicating name and model of each item.
b) Manufacturer's maintenance instructions for each component installed in Project. Instructions shall include installation instructions, parts numbers and lists, operation instructions of equipment, and maintenance and lubrication instructions.
5) Include copies of approved shop drawings and copies of required warranties.
2. If system has both wet and dry segments, provide single Operations And Maintenance Manual for total Fire Suppression System.

1.4 QUALITY ASSURANCE

A. Qualifications:
1. Designer:
a. Licensed fire protection engineer or fire protection system designer certified by NICET to level three minimum and engaged in design of fire protection systems. Engineer / designer shall:
1) Be responsible for overseeing preparation of shop drawings, hydraulic calculations where applicable, and system installation.
2) Make complete inspection of installation.
3) Provide corrected record drawings to Owner with letter of acceptance.
4) Certify that installation is in accordance with Contract Documents.
2. Installer: Licensed by jurisdiction having authority over installed fire protection systems for location of Project. Furnish verified list of similar projects installed during past 5 years minimum.

B. Requirements of Regulatory Agencies:
1. Unless noted otherwise, system shall conform to:
a. ANSI / NFPA 13 - 2002 'Light & Ordinary Hazard Occupancies.'
b. ANSI / NFPA 24 - 2002 'Service Mains and Their Appurtenances, Private.'
c. ANSI / NFPA 101 - 2000 'Life Safety Code.'
d. Requirements of local water department and local authority having jurisdiction for fire protection.
e. Applicable rules, regulations, laws, and ordinances.
f. Underwriter's Laboratories Publication, 'Fire Protection Equipment Directory', January 1990.
g. Comply with backflow prevention requirements and, if required, include device in hydraulic calculations.

1.5 OWNER'S INSTRUCTIONS

A. Instruct Owner's personnel in operation and maintenance of system utilizing Operation And Maintenance Manual when so doing. Minimum instruction period shall be four hours.

B. Instruction periods shall occur after Substantial Completion inspection when system is properly working and before final payment is made.

1.6 MAINTENANCE

A. Extra Materials: Furnish twelve spare heads of each type and temperature rating used, properly boxed with sprinkler head wrench.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Pipe:
   1. Above Ground: Schedule 40 black welded steel meeting requirements of ASTM A 53.
      a. 2 inches And Smaller: Welded, screwed, flanged, or roll grooved coupling system.
      b. 2-1/2 inches And Larger: Welded, flanged, or roll grooved coupling system.

B. Fittings:
   1. Screwed: Cast iron meeting requirements of ANSI B 16.4 or ductile iron meeting requirements of ANSI B 16.3 and ASTM A 536, Grade 65-45-12.
   2. Flanged: Cast iron meeting requirements of ANSI B 16.1.
   3. Welded: Carbon steel meeting requirements of ASTM A 234.
   4. Roll Grooved Pipe Coupling System:
      a. Ductile iron meeting requirements of ASTM A 395 and ASTM A 536, and UL listed and FM approved.
      b. Couplings:
         1) Rigid: Cast to provide rigidity for support and hanging in accordance with NFPA-13.
         2) Flexible: Use in locations where vibration attenuation and stress relief are required.
         3) Flange Adapters: Class 125 or 150.
      c. Grooved products used on Project shall be from same manufacturer. Grooving tools shall be as recommended by manufacturer of grooved products.
      d. Approved Manufacturers:
         1) Tyco grooved piping products
         2) Victaulic Coupling and FireLok fittings

C. Valves:
   1. Butterfly Valves:
      a. UL / FM / CASA approved.
      b. Indicating type.
      c. Approved Products:
         1) Kennedy: 93G1 or 93W1
         2) Nibco:
            a) WD3510-4 Wafer type with valve tamper switch
            b) GD4765-8N Grooved type with valve tamper switch
         3) Pratt Valves: IBV
         4) Victaulic: Series 705-W Grooved end type with internal supervisory switches
   2. Gate Valves:
      a. UL / FM / CASA approved.
      b. Outside Screw and Yoke Type (O.S.&Y).
      c. Class 150 psi.
      d. Approved Products:

1) Nibco: F-637-31 Flanged Ends.
2) Mueller: A-2073-6 Flanged Ends.

3. Ball Valves:
   a. UL / FM / CASA approved.
   b. Valve tamper switch.
   c. Approved Products:
      1) Milwaukee: BBSC with threaded ends.
      2) Nibco: KT-505 with threaded ends.
      3) Nibco: KG-505 with grooved ends.
      4) Victaulic: Series 728 with grooved or threaded ends
4. Swing Check Valves:
   a. 1/2 to 3 inch horizontal check.
      1) Regrinding type.
      2) Renewable disk.
      3) Bronze Class 125 with threaded ends.
      4) Approved Products:
         a) Nibco: KT-403-W.
         b) Stockham: B319C.
   b. 2-1/2 to 12 inch Horizontal check:
      1) Bolted bonnet.
      2) Raised face flanges.
      3) Bronze mounted with ductile iron body.
      4) 125 lb Class A.
      5) Approved Products:
         a) Nibco: F-938-31.
         b) Stockham: G939.
         c) Mueller: A-2120-6.
5. Wafer Type Check Valves:
   a. 4 to 8 inch cast iron body.
   b. 175 psi minimum working pressure.
   c. Rubber Seat.
   d. Approved Products:
      1) Nibco: KW-900-W.
      2) Mueller: A-2102.
6. Grooved-End Check Valves:
   a. 2-1/2 to 12 inch ductile iron body
   b. 250 psi maximum working pressure
   c. Disc And Seat:
      1) 2-1/2 And 3 Inch : Aluminum bronze disc with mounted elastomer seal and PPS (polyphenylene sulfide) coated seat.
      2) 4 Inch And Larger: Elastomer encapsulated ductile iron disc with welded in nickel seat.
   d. Approved Product:
      1) Victaulic Series 717
7. Alarm Check Valves:
   a. Approved Products:
      1) Reliable: E with gauges and drain.
      2) Tyco: F with gauges and drain
      3) Victaulic: Series 751 with gauges and drain
      4) Viking: J-1 with gauges and drain.
8. Double Check Valve Assembly:
   a. UL / FM / CASA approved and domestically manufactured.
   b. Assembly shall consist of two independent check modules within single housing, required test cocks, and drip-tight shutoff valves.
      1) Performance:
         a) Rated Working Pressure: 175 psi
         b) Hydrostatic Test Pressure: 350 psi
         c) Temperature Range: 33 to 140 deg F.
         d) End Connection: Grooved in accordance with AWWA C-606 (IPS) or Flanged in accordance with ANSI / ASME B161, Class 125.

2) Check valves shall have elastomer disks and provide drip-tight closure against reverse flow of liquid caused by back pressure or back siphonage.
3) Shutoff Valves: OS&Y gate valves or grooved end butterfly valves with integral tamper switchgear operator.

c. Approved Products:
1) Ames Colt / Maxim
2) Febco: Master Series 876V
3) Wilkins: 475DAV

9. Retard Chamber:
a. Self-draining.
b. Approved Products:
1) Reliable: E-1.
2) Tyco: F211
3) Victaulic: Series 752
4) Viking: C-1.

10. Inspector's Test Valve:
a. Ductile iron body with threaded ends.
b. Combination sight glass / orifice.
c. Bronze top works.
d. Approved Products:
1) Victaulic: Testmaster Alarm Test Module Style 720.

D. Sprinkler Heads:
1. Semi Recessed Pendant:
a. UL / FM / CASA approved.
b. Approved Manufacturers:
1) Reliable.
2) Victaulic.
3) Viking.

2. Horizontal Sidewall Sprinkler:
a. UL / FM / CASA approved.
b. Recess adjustable.
c. Where guards are required, use chrome plated sprinkler guards that are listed, that are approved by Sprinkler Manufacturer for use with head, and that are supplied by Sprinkler Manufacturer.
d. Wet System Approved Products:
1) Reliable: F-1 with Reliable recessed, 2-piece escutcheon Model GF1.
2) Tyco: Model TY-B with recessed escutcheon.
3) Victualic: Models V27 and V34, with recessed escutcheon
4) Viking: M HSW with Viking recessed, 2-piece escutcheon Model E-1.
e. Dry System Approved Products:
1) Reliable: F-3 with Reliable recessed, 2-piece escutcheon Model GF1.
2) Victualic: Model V36, with recessed escutcheon
3) Viking: M HSW with Viking recessed, 2-piece escutcheon Model E-1.

3. Pendant And Upright Sprinkler:
a. UL / FM / CASA approved.
b. Where guards or escutcheons are required, use chrome plated sprinkler guards and escutcheons that are listed, that are approved by Sprinkler Manufacturer for use with head, and that are supplied by Sprinkler Manufacturer.
c. Approved Products:
1) Reliable: F-1.
2) Tyco: TY-B
3) Victaulic: Models V27 and V34
4) Viking: Micromatic.

4. Adjustable Drop Nipple:
a. Steel tube, oxide coated.
b. Double O-ring seal.
c. 175 psi minimum working pressure.
d. Approved Products:
1) CECA: Cold Extrusion Company of America.

2) Merit: 'M.'

E. Water Flow Alarm:
1. Mechanical Flow Alarm: Water Gong.
a. UL / FM approved.
b. Approved Products:
1) Reliable: C.
2) Tyco: WMA-1
3) Victaulic: Series 760
4) Viking: F-2.

F. Pressure Gauges:
1. Mechanical Water Pressure Gauges:
a. UL / FM / CASA approved.
b. 3-1/2 inch diameter dial.
c. 0 to 300 psi in 5 psi increments.
d. Approved Products:
1) Reliable: UA.
2) HO Trerice: 500.

G. Pressure Gauges:
1. Mechanical Water Pressure Gauges -
a. UL / FM approved.
b. 3-1/2 inch diameter dial.
c. 0 to 300 psi in 5 psi increments.
d. Approved Products:
1) Reliable
2) HO Trerice: 500XB

H. Waterflow Detectors:
1. Electrical Water Flow Switch -
a. UL / FM approved.
b. Switch activates with flow of 10 gpm or more.
c. Two single pole double throw switches.
d. Automatic reset.
e. Approved Products -
1) Potter: VSR-F
2) System Sensor: WFD

I. Tamper Switch:
1. Weather And Tamper Resistant Switch:
a. UL / FM / CASA approved.
b. Two Single Pole Double Throw Switches.
c. Approved Products:
1) Potter: PCVS.
2) System Sensor: P1BV2.

J. Fire Department Connection:
1. Two-way Inlet with single clapper.
2. Polished Brass.
3. 3/4 Inch Straight Design Automatic Drain Device by Potter-Roemer Fig. 5982.
4. Round 'AUTO. SPKR.' identification plate, polished brass by Potter-Roemer Fig. 5962.
5. Approved Products:
a. Croker: 6405-PB
b. Potter-Roemer: Fig. 5710.

2.2 MANUFACTURERS

A. Contact Information:
   1. Ames Colt / Maxim,
   2. Cold Extrusion Company of America (CECA), Jacksonville, AR (501) 982-9463.
   3. Croker Corp, Elmsford, NY (800) 759-3473 or (914) 592-3640. www.croker.com
   4. Febco, Fresno, CA (209) 252-0791 www.cmb-ind.com.
   5. Henry Pratt Co, Aurora, IL (630) 844-4000. www.prattvalves.com
   6. HO Trerice Company, Oak Park, MI (888) 873-7423 or (248) 399-8000. www.hotco.com
   7. Merit Manufacturing Corp, Pottstown, PA (800) 543-7013 or (610) 327-4000. www.meritmfg.com
   8. Milwaukee Valve Co, Milwaukee, WI (414) 744-5240. www.milwaukeevalve.com
   9. Mueller Company, Decatur, IL (800) 423-1323 or (217) 423-4471. www.muellerflo.com
   10. Nibco Inc, Elkhart, IN (800) 234-0227 or (219) 295-3000. www.nibco.com
   11. Potter Electric Signal Co, St Louis, MO (800) 325-3936 or (314) 878-4321. www.pottersignal.com
   12. Potter-Roemer, Cerritos, CA (800) 366-3473 or (714) 530-5300. www.potterroemer.com
   13. Prinzing, Milwaukee, WI (800) 292-2914 www.prinzing.com
   14. Reliable Automatic Sprinkler Co, Mount Vernon, NY (800) 431-1588 or (914) 668-3470. www.reliablesprinkler.com
   15. Stockham, The Woodlands, TX (800) 786-2542 or (256) 775-3800. www.stockham.com
   16. System Sensor, St Charles, IL (800) 736-7672 or (630) 377-6580. www.systemsensor.com
   17. TYCO Fire & Building Products, Oak Creek, WI (877) 436-8926 or (215) 362-0700. www.tyco-fire.com
   18. Victualic Company of America, Easton, PA (610) 559-3300. www.victualic.com
   19. Viking Corp, Hastings, MI (800) 968-9501 or (616) 945-9501. www.vikingcorp.com
   20. Wilkins Operation, Paso Robles, CA (805) 238-7100 www.zurn.com.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Drawings:
   1. Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building
   2. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.

3.2 INSTALLATION

A. Connect system to flange provided under Section 02513.

B. Install system in accordance with NFPA 13.

C. Install system to drain. Drain trapped piping in accordance with NFPA 13, Paragraph 8.15.2.5 and 8.16.4.1.
   1. Install main drain from riser.
   2. Install auxiliary drains in low points of piping system and inspector's test valve drain to mechanical pad located outside building unless otherwise directed by Architect.

D. Install piping system so it will not be exposed to freezing temperatures.

E. Do not use dropped, damaged, or used sprinkler heads.

F. Install sprinkler lines concealed.

G. Install tamper switches and flow detectors where located by Architect.

H. Install automatic ball drip device in lowest point of piping to fire department connection and drain to exterior of building.

I. Brace and support system to meet seismic zone requirements for building site.

3.3 FIELD QUALITY CONTROL

A. Site Tests:
   1. Test system according to 'Contractor's Material And Testing certificate for Above Ground Piping' NFPA-13, figure 8-1(a).
   2. Tests shall be witnessed by Architect and representative of local jurisdiction over fire prevention.
   3. Test blanks shall have red painted lugs protruding beyond flange to clearly indicate their presence and be numbered to assure their removal when testing is completed.

END OF SECTION

SECTION 13935

DRY-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install complete fire sprinkler system as specified in Contract Documents.

B. Products Installed But Not Supplied Under This Section:
   1. Firestopping.

C. Related Sections
   1. Section 02513: Fire Suppression Utility Water Distribution Piping.
   2. Section 07840: Quality of Firestopping.
   3. Section 13851: Fire Alarm And Detection System including connection of tamper switches and pressure flow detectors to alarm system and furnishing and installing of low temperature switch.

1.2 REFERENCES

A. American National Standards Institute / American Society of Mechanical Engineers:
   1. ANSI / ASME B 16.1-89, 'Cast Iron Pipe Flanges and Pipe Flanged Fittings.'
   2. ANSI / ASME B 16.3-85, 'Malleable Iron Threaded Fittings, Classes 150 and 300.'
   3. ANSI / ASME B 16.4-89, 'Cast Iron Threaded Fittings, Class 125 and Class 250.'

B. American National Standards Institute / National Fire Protection Association:
   1. ANSI / NFPA 13-1991, 'Installation of Sprinkler Systems.'

C. American Society For Testing And Materials:
   1. ASTM A 53-00, 'Standard Specification for Pipe, Steel and Hot-Dipped, Zinc-Coated, Welded and Seamless.'
   2. ASTM A 234-00a, 'Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperature Service.'
   3. ASTM A 395-99, ‘Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.’
   4. ASTM A 536-84 (1999), 'Standard Specification for Ductile Iron Castings.'

1.3 SUBMITTALS

A. Shop Drawings:
   1. Size sprinkler system by one of following methods:
      a. Pipe schedule method in accordance with ANSI / NFPA 13.
      b. Hydraulic calculation design method based on water supply evaluation performed at building site.
      c. On submittals, refer to sprinkler heads by sprinkler identification or model number published in appropriate agency listing or approval. Trade names and other abbreviated designations are not acceptable.
   2. Submittal Procedure:
      a. After award of Contract and before purchase of equipment, submit seven sets of shop drawings with specifications and hydraulic calculations, if pipe schedule method is not used, to Architect and two sets to local jurisdiction having authority for fire prevention for review.
      b. After integrating Architect's and local jurisdiction's comments into drawings, licensed certified fire protection engineer of record submitting fire sprinkler system design construction

documents shall stamp, sign, and date each sheet of shop drawings and first page of specifications and calculations.
c. Submit stamped documents to area office and local jurisdiction having authority for fire prevention for final approval.
d. After final approval, submit four copies of approved stamped documents to Architect.
e. Failure of system to meet requirements of authority having jurisdiction shall be corrected at no additional cost to Owner.

B. Closeout:
1. Operation And Maintenance Manual Data:
a. Modify and add to requirements of Section 01700 as follows:
1) Provide master index showing items included.
2) Provide name, address, and phone number of Architect, Architect's Fire Sprinkler Consultant, General Contractor, and Fire Protection subcontractor.
3) Provide operating instructions to include:
a) General description of fire protection system.
b) Step by step procedure to follow in putting system into operation.
4) Maintenance instructions shall include:
a) List of system components used indicating name and model of each item.
b) Manufacturer's maintenance instructions for each component installed in Project. Instructions shall include installation instructions, parts numbers and lists, operation instructions of equipment, and maintenance and lubrication instructions.
5) Include copies of approved shop drawings and copies of required warranties.
2. If system has both wet and dry segments, provide single Operations And Maintenance Manual for total Fire Suppression System.

1.4 QUALITY CONTROL

A. Qualifications
a. Licensed fire protection engineer or fire protection system designer certified by NICET to level three minimum and engaged in design of fire protection systems. Engineer / designer shall:
1) Be responsible for overseeing preparation of shop drawings, hydraulic calculations where applicable, and system installation.
2) Make complete inspection of installation.
3) Provide corrected record drawings to Owner with letter of acceptance.
4) Certify that installation is in accordance with Contract Documents.
2. Installer: Licensed by jurisdiction over installed fire protection systems for area of Project. Furnish verified list of similar projects installed during past five years minimum.

B. Requirements of Regulatory Agencies:
1. Unless noted otherwise, system shall conform to:
a. ANSI / NFPA 13: 1991 'Light & Ordinary Hazard Occupancies.'
b. ANSI / NFPA 24: 1992 'Service Mains and Their Appurtenances, Private.'
c. ANSI / NFPA 101: 1991 'Life Safety Code.'
d. Requirements of local water department and local authority having jurisdiction for fire protection.
e. Underwriter's Laboratories Publication, 'Fire Protection Equipment Directory', January 1990.
f. Comply with backflow prevention requirements and, if required, include device in hydraulic calculations.
g. Applicable rules, regulations, laws, and ordinances.

1.5 OWNER'S INSTRUCTIONS

A. Instruct building maintenance personnel in operation and maintenance of system utilizing Operation And Maintenance Manual when so doing. Minimum instruction period shall be four hours.

B. Instruction period shall occur after Substantial Completion inspection when system is properly working and before final payment is made.

1.6 MAINTENANCE

A. Extra Materials: Furnish six spare heads of each type and temperature rating used, stored in cabinet properly sized by Sprinkler Manufacturer, and sprinkler head wrench.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Pipe:
   1. Above Ground: Schedule 40 hot-dip galvanized welded steel meeting requirements of ASTM A135.
      a. 2 Inches And Smaller: Screwed, flanged, or roll grooved coupling system.
      b. 2-1/2 Inches And Larger: Flanged or roll grooved coupling system.

B. Fittings
   1. Screwed: Cast iron meeting requirements of ANSI B 16.4 or ductile iron meeting requirements of ANSI B 16.3 and ASTM A 536, Grade 65-45-12.
   2. Flanged: Cast iron meeting requirements of ANSI B 16.1.
   3. Roll Grooved Pipe Coupling System:
      a. Ductile iron meeting requirements of ASTM A 395 and ASTM A 536, and UL listed and FM approved.
      b. Couplings:
         1) Rigid: Cast to provide rigidity for support and hanging in accordance with NFPA-13.
         2) Flexible: Use in locations where vibration attenuation and stress relief are required.
         3) Flange Adapters: Class 125 or 150.
      c. Grooved products used on Project shall be from same manufacturer. Grooving tools shall be as recommended by manufacturer of grooved products.
      d. Approved Manufacturers:
         1) Tyco grooved piping products.
         2) Victaulic Coupling and FireLok fittings.

C. Valves:
   1. Butterfly Valves:
      a. UL / FM / CASA approved.
      b. Indicating type.
      c. Approved Products:
         1) Kennedy: 93G1 or 93W1
         2) Nibco:
            a) WD3510-4 Wafer type with valve tamper switch
            b) GD4765-8N Grooved type with valve tamper switch
         3) Pratt Valves: IBV
         4) Victaulic: Series 705-W Grooved end type with internal supervisory switches
   2. Gate Valves:
      a. UL / FM / CASA approved.
      b. Outside Screw and Yoke Type (O.S.&Y).
      c. Class 150 psi.
      d. Approved Products:
         1) Nibco: F-637-31 Flanged Ends.
         2) Mueller: A-2073-6 Flanged Ends.
   3. Ball Valves:
      a. UL / FM / CASA approved.
      b. Valve tamper switch.

c. Approved Products:
    1) Milwaukee: BBSC with threaded ends.
    2) Nibco: KT-505 with threaded ends.
    3) Nibco: KG-505 with grooved ends.
    4) Victaulic: Series 728 with grooved or threaded ends

4. Swing Check Valves:
    a. 1/2 to 3 inch horizontal check.
        1) Regrinding type.
        2) Renewable disk.
        3) Bronze Class 125 with threaded ends.
        4) Approved Products:
            a) Nibco: KT-403-W.
            b) Stockham: B319C.
    b. 2-1/2 to 12 inch Horizontal check:
        1) Bolted bonnet.
        2) Raised face flanges.
        3) Bronze mounted with ductile iron body.
        4) 125 lb Class A.
        5) Approved Products:
            a) Nibco: F-938-31.
            b) Stockham: G939.
            c) Mueller: A-2120-6.
5. Wafer Type Check Valves:
    a. 4 to 8 inch cast iron body.
    b. 175 psi minimum working pressure.
    c. Rubber Seat.
    d. Approved Products:
        1) Nibco: KW-900-W.
        2) Mueller: A-2102.
6. Grooved-End Check Valves:
    a. 2-1/2 to 12 inch ductile iron body
    b. 250 psi maximum working pressure
    c. Disc And Seat:
        1) 2-1/2 And 3 Inch : Aluminum bronze disc with mounted elastomer seal and PPS (polyphenylene sulfide) coated seat.
        2) 4 Inch And Larger: Elastomer encapsulated ductile iron disc with welded in nickel seat.
    d. Approved Product:
        1) Victaulic Series 717
7. Dry Pipe Alarm Valves:
    a. Approved Products:
        1) Reliable: D with gauges, drain, and trim.
        2) Tyco: DPV-1
        3) Victaulic: Series 757P
        4) Viking: F-1 with gauges, drain, and trim.
8. Air Maintenance Device:
    a. Maximum inlet air pressure 125 psi, minimum outlet air pressure 65 psi.
    b. Approved Products:
        1) Reliable: B-1.
        2) Tyco: ACC-1
        3) Victaulic: 746
        4) Viking: D-2.
9. Accelerator:
    a. Install with pressure gauge.
    b. Approved Products:
        1) Reliable: B-1.
        2) Tyco: ACC-1
        3) Victaulic: 746
        4) Viking: E-1.
10. Inspector's Test Valve:
    a. Ductile iron body with threaded ends.

b. Combination sight glass/orifice.
c. Bronze top works.
d. Approved Products:
1) Victaulic: Testmaster II Alarm Test Module Style 720.

D. Sprinkler Heads:
1. Dry Concealed Pendant:
a. UL / FM / CASA approved.
b. Approved Manufacturers:
1) Reliable.
2) Victaulic.
2. Upright Sprinklers:
a. UL / FM / CASA approved.
b. Include flush chrome escutcheon equal to Reliable C.
c. Where guards are required, include chrome plated sprinkler guards that are listed, that are approved by Sprinkler Manufacturer for use with head, and that are supplied by Sprinkler Manufacturer.
d. Approved Products:
1) Reliable: F1.
2) Tyco: TY-B
3) Victaulic: Models V27 and V34, with recessed escutcheon.
4) Viking: Micromatic.
3. Horizontal Sidewall Sprinkler:
a. UL / FM / CASA approved.
b. Recess adjustable.
c. Where guards are required, include chrome-plated guard equal to Viking A-1.
d. Approved Products:
1) Reliable: F-1 with recessed, two-piece escutcheon Model GF-1.
2) Viking: M HSW with recessed, two-piece escutcheon E-1.
3) Star: LD-2 with Nova Series recessed escutcheon.

E. Water Flow Alarm:
1. Mechanical Flow Alarm:
a. UL / FM / CASA approved.
b. Approved Products:
1) Reliable: C.
2) Tyco: WMA-1
3) Victaulic: Series 760
4) Viking: F-2.

F. Pressure Gauges:
1. Mechanical Water Pressure Gauges:
a. UL / FM / CASA approved.
b. 3-1/2 inch diameter dial.
c. 0 to 300 psi in 5 psi increments.
d. Approved Products:
1) Reliable.
2) Trerice: 500.

G. Pressure Detectors:
1. Electrical Water Pressure Switch:
a. UL / FM / CASA approved.
b. Switch activates on pressure rise between 4 and 8 psi.
c. Two single pole double throw switches.
d. Automatic reset.
e. Approved Products:
1) Potter Electric Signal Co: PS10.
2) System Sensor: EPS10.

H. Low Pressure Supervisory Switch:
   1. UL / FM / CASA approved.
   2. Adjustable pressure range 1 to 100 psi.
   3. Automatic reset.
   4. Factory adjusted to separate on pressure decrease of 30 psi.
   5. Approved Products:
      a. Potter Electric Signal Co: PS40-1.
      b. System Sensor: EPS10.

I. Tamper Switch:
   1. Weather and tamper resistant switch.
   2. UL / FM / CASA approved.
   3. Two single pole double throw switches.
   4. Approved Products:
      a. Potter Electric Signal Co: PCVS.
      b. System Sensor: P1BV2

J. Fire Department Connection:
   1. Two-way Inlet with single clapper.
   2. Polished Brass.
   3. 3/4 inch Straight Design Automatic Drain Device by Potter-Roemer Fig. 5982.
   4. Round 'AUTO. SPKR.' Identification Plate, Polished Brass by Potter-Roemer Fig. 5962.
   5. Approved Products:
      a. Croker: 6405PB
      b. Potter-Roemer: Fig 5710.

K. Air Compressor:
   1. Tank-mounted, 17 gallon tank rated at 165 psi working pressure. Restrict speed of compressor to between 700 and 900 RPM.
   2. Set tank-mounted air compressor on neoprene isolation pads located at each corner and sized 4 inches by 4 inches by 3/4 inches high.
   3. Wire air compressor to circuit breaker.
   4. Furnish with air intake filter and silencer.
   5. Overload protected 1750 RPM motor. One hp, single phase, 115V.
   6. Industrial grade with totally enclosed steel belt guard.
   7. Auto control group mounted and pre-wired. Auto group includes pressure switch, check valve, manifold, safety valve, and mounting.
   8. Acceptable Products:
      a. Emglo: K1S-17S.
      b. Equal as approved by Architect before bidding. See Section 01 6000.

2.2 MANUFACTURERS

A. Contact Information:
   1. Croker Corp, Elmsford, NY (800) 759-3473 or (914) 592-3640. www.croker.com
   2. Emglo Air Compressors, Johnstown, PA (814) 269-1000. www.emglocompressor.com
   3. HO Trerice Company, Oak Park, MI (888) 873-7423 or (248) 399-8000. www.hotco.com
   4. Merit Manufacturing Corp, Pottstown, PA (800) 543-7013 or (610) 327-4000. www.meritmfg.com
   5. Milwaukee Valve Co, Milwaukee, WI (414) 744-5240. www.milwaukeevalve.com
   6. Mueller Company, Decatur, IL (800) 423-1323 or (217) 423-4471. www.muellerflo.com
   7. Nibco Inc, Elkhart, IN (800) 234-0227 or (219) 295-3000. www.nibco.com
   8. Potter Electric Signal Co, St Louis, MO (800) 325-3936 or (314) 878-4321. www.pottersignal.com
   9. Potter-Roemer, Cerritos, CA (800) 366-3473 or (714) 530-5300. www.potterroemer.com
   10. Henry Pratt Co, Aurora, IL (630) 844-4000. www.prattvalves.com
   11. Reliable Automatic Sprinkler Co, Mount Vernon, NY (800) 431-1588 or (914) 668-3470. www.reliablesprinkler.com
   12. Star Sprinkler Corp, Oak Creek, WI (800) 558-5236 or (414) 570-5000. www.starsprinkler.com

13. Stockham, The Woodlands, TX (800) 786-2542 or (256) 775-3800. www.stockham.com
14. System Sensor, St Charles, IL (800) 736-7672 or (630) 377-6580. www.systemsensor.com
15. TYCO Fire & Building Products, Oak Creek, WI (877) 436-8926 or (215) 362-0700. www.tyco-fire.com
16. Victualic Company of America, Easton, PA (610) 559-3300 or Victualic Company of Canada, Rexdale, ON (416) 675-5575. www.victualic.com
17. Viking Corp, Hastings, MI (800) 968-9501 or (616) 945-9501. www.vikingcorp.com
18. Walworth Company, Houston, TX (800) 735-6007 or (713) 777-7788. www.walworthvalve.com

PART 3 - EXECUTION

3.1 EXAMINATION

A. Drawings:
   1. Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over Fire Protection Drawings.
   2. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.

3.2 INSTALLATION

A. Install system in accordance with NFPA 13.

B. Connect system to flange provided under Section 02513.

C. Install system to drain. Drain trapped piping in accordance with ANSI / NFPA 13, Paragraphs 8.15.2.5 and 8.16.4.1.
   1. Install main drain from riser.
   2. Install auxiliary drains in low points of piping system and inspector's test valve drain to mechanical pad located outside building, unless directed otherwise by Architect.

D. Install piping system so it will not fail due to freezing temperatures.

E. Do not use dropped, damaged, or used sprinkler heads.

F. Pendants:
   1. Do not use regular pendants.
   2. Install dry pendants with tees and not elbows. Do not adjust length with pipe nipples and couplings.
   3. Individually measure and order each dry pendant based on measured distance from ceiling to face of branch line tee.

G. Minimum slope of branch lines is 1/2 inch per 10 feet. Minimum slope of main lines is 1/4 inch per 10 feet.

H. Install sprinkler lines concealed.

I. Install tamper switches and pressure flow detectors where located by Architect.

J. Install automatic ball drip device in lowest point of piping to the fire department connection and drain to floor drain or exterior of building.

K. Brace and support system to meet seismic zone requirements for building site.

3.3 FIELD QUALITY CONTROL

A. Site Tests:
   1. Test system according to 'Contractor's Material & Testing Certificate for Above Ground Piping' NFPA-13, figure 16.1.
   2. Tests shall be witnessed by Architect and by representative of local jurisdiction having authority for fire prevention.
   3. Test blanks shall have red painted lugs protruding beyond flange to clearly indicate their presence and be numbered to assure their removal when testing is completed.

END OF SECTION

DIVISION 15 - MECHANICAL

END OF TABLE OF CONTENTS

SECTION 15051

GENERAL MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. General requirements and procedures for mechanical systems.
   2. Responsibility for proper operation of electrically powered equipment furnished under this Division.
   3. Interface with Testing And Balancing Agency.
   4. Furnish and install sealants relating to installation of systems installed under this Division.
   5. Furnish and install Firestop Penetration Systems for mechanical system penetrations as described in Contract Documents.

B. Products Supplied But Not Installed Under This Section:
   1. Sleeves, inserts, supports, and equipment for mechanical systems installed under other Sections.

C. Related Sections:
   1. Section 13352: Air balance and final adjustment.
   2. Division 16: Raceway and conduit, unless specified otherwise, line voltage wiring, outlets, and disconnect switches.
   3. Slots and openings through floors, walls, ceilings, and roofs provided under other Divisions in their respective materials.

1.2 SUBMITTALS

A. Product Data:
   1. Manufacturer's catalog data for each manufactured item.
      a. Provide section in submittal for each type of item of equipment. Include Manufacturer's catalog data of each manufactured item and enough information to show compliance with Contract Document requirements. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined.
      b. Include name, address, and phone number of each supplier.

B. Shop Drawings:
   1. Schematic control diagrams for each separate fan system, heating system, control panel, etc. Each diagram shall show locations of all control and operational components and devices. Mark correct operating settings for each control device on these diagrams.
   2. Diagram for electrical control system showing wiring of related electrical control items such as firestats, fuses, interlocks, electrical switches, and relays. Include drawings showing electrical power requirements and connection locations.
   3. Drawing of each temperature control panel identifying components in panels and their function.
   4. Other shop drawings required by Division 15 trade Sections.

C. Closeout:
   1. Operation And Maintenance Manual Data:
      a. Modify and add to requirements as follows:
         1) At beginning of MECHANICAL section of Operations And Maintenance Manual, provide master index showing items included.
         2) Provide name, address, and phone number of Architect, Architect's Mechanical Engineer, General Contractor, and Mechanical, Plumbing, Sheet Metal, Refrigeration, and Temperature Control subcontractors.
         3) Provide operating instructions to include:

a) General description of each plumbing and mechanical system.
b) Step by step procedure to follow in putting each piece of mechanical equipment into operation.
c) Provide diagrams for electrical control system showing wiring of items such as smoke detectors, fuses, interlocks, electrical switches, and relays.

4) Identify maintenance instructions by using same equipment identification used in Contract Drawings. Maintenance instructions shall include:
   a) List of mechanical equipment used indicating name, model, serial number, and nameplate data of each item together with number and name associated with each system item.
   b) Manufacturer's maintenance instructions for each piece of mechanical equipment installed in Project. Instructions shall include name of vendor, installation instructions, parts numbers and lists, operation instructions of equipment, and maintenance and lubrication instructions.
   c) Summary list of mechanical equipment requiring lubrication showing name of equipment, location, and type and frequency of lubrication.
   d) Manual for thermostat operation.
5) Include copies of approved shop drawings and copies of warranties required in individual Sections of Division 15.

1.3 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:
   1. Perform work in accordance with applicable provisions of Plumbing Codes and Gas Ordinances applicable to Project. Provide materials and labor necessary to comply with rules, regulations, and ordinances.
   2. In case of differences between building codes, laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Notify Architect in writing of such differences before performing work affected by such differences.

B. Identification:
   1. Motor and equipment name plates as well as applicable UL / ULC and AGA / CGA labels shall be in place when Project is turned over to Owner.
   2. Materials shall bear Manufacturer's name and trade name. Equipment and materials of same general type shall be of same make throughout work to provide uniform appearance, operation, and maintenance.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Storage:
   1. In addition to requirements specified in Division 01, stored material shall be readily accessible for inspection by Architect until installed.
   2. Store items subject to moisture damage, such as controls, in dry, heated spaces.

B. Handling: Protect bearings during installation. Thoroughly grease steel shafts to prevent corrosion.

1.5 WARRANTY

A. Guarantee heating, cooling, and plumbing systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.

B. Provide certificates of warranty for each piece of equipment made out in favor of Owner. Clearly record 'start-up' date of each piece of equipment on certificate.

C. If mechanical sub-contractor with offices located more than 150 miles from Project site is used, provide service / warranty work agreement for warranty period with local mechanical sub-contractor

approved by Architect. Include copy of service / warranty agreement in warranty section of Operation And Maintenance Manual.

1.6 SYSTEM START-UP

A. Off-Season Start-up:
   1. If Substantial Completion inspection occurs during heating season, schedule spring start-up of cooling systems. If inspection occurs during cooling season, schedule autumn start-up for heating systems.
   2. Notify Owner seven days minimum before scheduled start-up.
   3. Time will be allowed to completely service, test, check, and off-season start systems. During allowed time, train Owner's representatives in operation and maintenance of system.
   4. At end of off-season start-up, furnish Owner with letter confirming that above work has been satisfactorily completed.

B. Preparations that are to be completed before start up and operation include, but are not limited to, following:
   1. Dry out electric motors and other equipment to develop and properly maintain constant insulation resistance.
   2. Make adjustments to insure that:
      a. Equipment alignments and clearances are adjusted to allowable tolerances.
      b. Nuts and bolts and other types of anchors and fasteners are properly and securely fastened.
      c. Packed, gasketed, and other types of joints are properly made up and are tight and free from leakage.
      d. Miscellaneous alignings, tightenings, and adjustings are completed so systems are tight and free from leakage and equipment performs as intended.
   3. Motors and accessories are completely operable.
   4. Inspect and test electrical circuitry, connections, and voltages to be properly connected and free from shorts.
   5. Adjust drives for proper alignment and tension.
   6. Make certain filters in equipment for moving air are new and of specified type.
   7. Properly lubricate and run-in bearings in accordance with Manufacturer's directions and recommendations.

1.7 OWNER'S INSTRUCTIONS

A. Instruct building maintenance personnel in operation and maintenance of mechanical systems utilizing Operation And Maintenance Manual when so doing.
   1. Minimum Instruction Periods:
      a. Mechanical: Eight hours.
      b. Temperature Control: Four hours.
      c. Refrigeration: Four hours.
   2. Conduct instruction periods after Substantial Completion inspection when systems are properly working and before final payment is made. None of these instructional periods shall overlap another.

PART 2 - PRODUCTS: Not Used

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Inspection:

1. Examine premises to understand conditions that may affect performance of work of this Division before submitting proposals for this work. Examine adjoining work on which mechanical work is dependent for efficiency and report work that requires correction.
2. No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.

B. Drawings:
1. Plumbing and Mechanical Drawings show general arrangement of piping, ductwork, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
2. Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over Plumbing and Mechanical Drawings.
3. Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.

C. Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.

3.2 PREPARATION

A. Check that slots and openings provided under other Divisions through floors, walls, ceilings, and roofs are properly located. Perform cutting and patching caused by neglecting to coordinate with Divisions providing slots and openings at no additional cost to Owner.

B. Changes Due To Equipment Selection:
1. Where equipment specified or otherwise approved requires different arrangement or connections from that shown in Contract Documents, submit drawings, if requested by Architect, showing proposed installations.
2. If proposed changes are approved, install equipment to operate properly and in harmony with intent of Contract Documents. Make incidental changes in piping, ductwork, supports, installation, wiring, heaters, panelboards, and as otherwise necessary.
3. Provide any additional motors, valves, controllers, fittings, and other additional equipment required for proper operation of the system resulting from selection of equipment, including all required changes in affected trades.
4. Be responsible for the proper location of roughing-in and connections provided under other Divisions.

3.3 INSTALLATION

A. Interface With Other Work:
1. Electrical: Furnish exact location of electrical connections and complete information on motor controls to installer of electrical system.
2. Testing And Balancing:
   a. Put mechanical systems into full operation and continue their operation during each working day of testing and balancing.
   b. Make changes in pulleys, belts, fan speeds, and dampers or add dampers as required for correct balance as recommended by appropriate Sections of Division 13 and at no additional cost to Owner.

B. Cut carefully to minimize necessity for repairs to previously installed or existing work. Do not cut beams, columns, or trusses.

C. Locating Equipment:
   1. Arrange pipes, ducts, and equipment to permit ready access to valves, cocks, unions, traps, filters, starters, motors, control components, and to clear openings of doors and access panels.
   2. Adjust locations of pipes, ducts, switches, panels, equipment, and fixtures to accommodate work to interferences anticipated and encountered.
   3. Install mechanical work to permit removal of equipment and parts of equipment requiring periodic replacement or maintenance without damage to or interference with other parts of equipment or structure.
   4. Determine exact route and location of each pipe and duct before fabrication.
      a. Right-Of-Way:
         1) Lines that pitch shall have right-of-way over those that do not pitch. For example, steam, steam condensate, and plumbing drains shall normally have right-of-way.
         2) Lines whose elevations cannot be changed shall have right-of-way over lines whose elevations can be changed.
      b. Offsets, Transitions, and Changes in Direction:
         1) Make offsets, transitions, and changes in direction in pipes and ducts as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.
         2) Furnish and install all traps, air vents, sanitary vents, and devices as required to effect these offsets, transitions, and changes in direction.

D. Penetration Firestops: Install Penetration Firestop System appropriate for penetration at mechanical system penetrations through walls, ceilings, roofs, and top plates of walls.

E. Sealants:
   1. Seal openings through building exterior caused by penetrations of elements of mechanical systems.
   2. Furnish and install acoustical sealant to seal penetrations through acoustically insulated walls and ceilings.

3.4 REPAIR / RESTORATION

A. Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.
   1. Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown.
   2. Surface finishes shall exactly match existing finishes of same materials.

B. Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.

3.5 CLEANING

A. Clean exposed piping, ductwork, equipment, and fixtures. Remove stickers from fixtures and adjust flush valves.

B. No more than one week before Final Inspection, flush out bearings and clean other lubricated surfaces with flushing oil. Provide best quality and grade of lubricant specified by Equipment Manufacturer.

C. Replace filters in equipment for moving air with new filters of specified type no more than one week before Final Inspection.

3.6 PROTECTION

A. Do not operate pieces of equipment used for moving supply air without proper air filters installed properly in system.

B. After start-up, continue necessary lubrication and be responsible for damage to bearings while equipment is being operated up to Substantial Completion.

END OF SECTION

SECTION 15075

MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install identification of equipment and piping as described in Contract Documents.

PART 2 - PRODUCTS

2.1 LABELS

A. Equipment Identification: Black formica, with white reveal when engraved. Lettering to be 3/16 inch high minimum.

2.2 PAINT

A. One Coat Primer:
   1. 6-2 Quick Drying Latex Primer Sealer over fabric covers.
   2. 6-205 Metal Primer under dark color paint.
   3. 6-6 Metal Primer under light color paint.

B. Finish Coats: Two coats 53 Line Acrylic Enamel.

C. Quality Standard: Paints specified are from Pittsburgh Paint & Glass (PPG), Pittsburgh, PA (800) 441-9695. www.ppgaf.com or PPG Canada Inc, Missisauga, ON (800) 263-4350 or (905) 238-6441

D. Approved Products:
   1. Paint of equal quality from following Manufacturers may be submitted for Architect's approval before use. Maintain specified colors, shades, and contrasts.
      a. Benjamin Moore, Montvale, NJ (888) 236-6667 or (201) 573-9600 www.benjaminmoore.com or Toronto, ON (800) 304-0304 or (416) 766-1176.
      b. ICI Dulux, Cleveland, OH (800) 984-5444 or (216) 984-5444 www.icidulux.com or ICI Paints Canada Inc, Concord, ON (800) 387-3767 or (905) 738-0080.
      c. Sherwin Williams, Cleveland, OH (800) 321-8194 or (216) 566-2000. www.sherwin-williams.com

PART 3 - EXECUTION

3.1 APPLICATION

A. Labels:
   1. Identify following items with specified labels fastened to equipment with screws:
      a. Thermostats and control panels in mechanical spaces.
      b. Furnaces.
      c. Condensing units.
      d. Accessible exhaust fans.
   2. Engrave following data from Equipment Schedules on Drawings onto labels:
      a. Equipment mark.

b. Area served.

B. Painting:
1. Only painted legends, directional arrows, and color bands are acceptable.
2. Locate identifying legends, directional arrows, and color bands at following points on exposed piping of each piping system:
a. Adjacent to each item of equipment.
b. At point of entry and exit where piping goes through wall.
c. On each riser and junction.
d. Every 25 feet on long continuous lines.
e. Stenciled symbols shall be one inch high and black.

3.2 SCHEDULES

A. Schedule of Abbreviations for Pipe Stencils and Equipment Identification and Background Colors for Pipe Identification:
1. Apply stenciled symbols as follows:

Pipe Type	Symbol
Potable Hot Water	HW
Potable Cold Water	CW

2. Apply stenciled symbols and continuous painting as follows:

Pipe Type	Pipe Color	Symbol
Gas	Yellow	GAS

END OF SECTION

SECTION 15081

THERMAL DUCT INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install thermal wrap duct insulation as described in Contract Documents.

B. Related Work:
   1. Section 15812: Low-Pressure Steel Ducts.
   2. Section 15820: Acoustic duct liner.

1.2 REFERENCES

A. American Society for Testing and Materials:
   1. ASTM B 209-01, 'Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.'

PART 2 - PRODUCTS

2.1 MATERIALS

A. Thermal Wrap Duct Insulation:
   1. 2 inch thick fiberglass with factory-laminated, reinforced aluminum foil scrim kraft facing and density of one lb/ per cu ft.
   2. Thermal Conductivity: 0.27 BTU in/HR SF deg F at 75 deg F maximum.
   3. Approved Products:
      a. Type 100 standard duct insulation by Certainteed St Gobain, Valley Forge, PA (800) 233-8990 or (610) 341-7739. www.certainteed.com
      b. Microlite FSK by Johns-Manville, Denver, CO (800) 654-3103 or (303) 978-2000. www.jm.com
      c. Duct Wrap FSK by Knauf Fiber Glass, Shelbyville, IN (800) 825-4434 or (317) 398-4434 www.knauffiberglass.com.
      d. Alley Wrap FSK by Manson Insulation Inc, Brossard, PQ, Canada (800) 626-7661 or (450) 659-9101.
      e. FRK by Owens-Corning, Toledo, OH (800) 438-7465 or (419) 248-8000 www.owenscorning.com.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Thermal Wrap Duct Insulation:
   1. Install insulation as follows:
      a. On outside air ducts and combustion air ducts within building insulation envelope.
      b. On other air ducts where indicated on Drawings.
   2. Wrap insulation tightly on ductwork with circumferential joints butted and longitudinal joints overlapped minimum 2 inches.
      a. Do not compress insulation except in areas of structural interference. Minimum thickness at corners shall be one inch thick.

b. Remove insulation from lap before stapling.
c. Staple seams at approximately 16 inches on center with outward clenching staples.
d. Seal seams with foil vapor barrier tape or vapor barrier mastic. Seal penetrations of facing to provide vapor tight system.

B. Insulate outside of ceiling diffusers and diffuser drops same as ductwork.

END OF SECTION

SECTION 15083

POTABLE WATER PIPE INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install insulation on hot and cold water lines, fittings, valves, and accessories as described in Contract Documents.

B. Related Sections:
   1. Section 15141: Potable Water Piping Systems.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Above Grade:
   1. Insulation For Piping:
      a. Snap-on glass fiber or melamine foam pipe insulation, or heavy density pipe insulation with factory vapor jacket.
      b. Insulation Thickness:

	Service Water Temp In Deg F	Pipe Sizes in inches Up to 1-1/4	1-1/2 to 2	Over 2
a)	170 - 180	1	1-1/2	2
b)	140 - 160	1/2	1	1-1/2
c)	45 - 130	1/2	1/2	1

      c. Quality Standards: Techlite SSL by Accessible Products or Fiberglas ASJ by Owens-Corning.
      d. Approved Manufacturers:
         1) Accessible Products.
         2) Childers Products.
         3) Knauf.
         4) Manson.
         5) Owens-Corning.
         6) Johns-Manville.
   2. Fitting, Valve, And Accessory Covers:
      a. PVC.
      b. Quality Standard: Techlite SSL-ASJ by Accessible Products.
      c. Approved Manufacturers:
         1) Accessible Products.
         2) Knauf.
         3) Speedline.
         4) Zeston by Johns-Manville.

B. Below Grade Piping:
   1. Insulation:
      a. 1/2 inch thick.
      b. Approved Products:
         1) DG Tubolit by Armacell.
         2) ImcoLock or ImcoShield by Imcoa.
         3) Nomalock or Nomaply by Nomaco.

4) Therma-Cel by Rubatex.

2. Joint Sealant:
   a. Armacell 520.
   b. Rubatex R-373.

2.2 MANUFACTURERS

A. Contact Information:
1. Accessible Products Inc, Tempe, AZ (800) 922-5252 or (602) 967-8888. www.accessibleproducts.com
2. Armacell, Mebane, NC (800) 232-3341. www.armaflex.com
3. Childers Products Co, Eastlake, OH (440) 953-5200.
4. IMCOA, Haltom City, TX (800) 535-5078 or (817) 485-5290 www.imcoa.com.
5. Johns-Manville, Denver, CO (800) 654-3103 or (303) 978-2000. www.jm.com
6. Knauf, Shelbyville, IN (800) 825-4434 or (310) 398-4434 www.knauffiberglass.com.
7. Manson, Brossard, PQ, Canada (800) 626-7661 or (450) 659-9101.
8. Nomaco Inc, Zebulon, NC (800) 345-7279 or (919) 269-6500. www.nomaco.com
9. Owens-Corning, Toledo, OH (800) 438-7465 or (419) 248-8000 www.owenscorning.com.
10. Rubatex, Roanoke, VA (800) 782-2839 or (540) 561-6000. www.rbxcorp.com
11. Speedline.

PART 3 - EXECUTION

3.1 APPLICATION

A. Above Grade Piping:
1. Apply insulation to clean, dry piping with joints tightly butted.
2. Install insulation in manner to facilitate removal for repairs. Place sections or blocks so least possible damage to insulation will result from inspection or repairs of piping or equipment.
3. Piping up to 1-1/4 Inch Diameter: Adhere 'factory applied vapor barrier jacket lap' smoothly and securely at longitudinal laps with white vapor barrier adhesive. Adhere 3 inch wide self-sealing butt joint strips over end joints.
4. Piping 1-1/2 Inch Diameter And Larger:
   a. Use broken-joint construction in application of two-layer covering.
   b. Fill cracks and depressions with insulating cement mixed to thick plastic paste. Apply by hand in several layers to make up total specified thickness. Final layer shall have smooth uniform finish before application of covering.
   c. Apply one heavy brush coat of sizing such as Foster Sealfast 30-36 or CP-10 or 11 lagging adhesive to canvas before painting.
5. Fittings, Valves, And Accessories:
   a. Do not apply insulation over flanged joints or victaulic couplings until piping has been brought up to operating temperature and flange bolts have been fully tightened. Insulate valves so wheel, stem, and packing nut are exposed.
   b. Insulate with same type and thickness of insulation as pipe, with ends of insulation tucked snugly into throat of fitting and edges adjacent to pipe insulation tufted and tucked in.
   c. In Piping Up To 1-1/4 Diameter: Cover insulation with one piece fitting cover secured by stapling or taping ends to adjacent pipe covering.
      1) Alternate Method: Insulate fittings, valves, and accessories with one inch of insulating cement and vapor seal with two 1/8 inch wet coats of vapor barrier mastic reinforced with glass fabric extending 2 inches onto adjacent insulation.
   d. For Piping 1-1/2 inches To 2 Inches: Insulate with hydraulic setting insulating cement or equal, to thickness equal to adjoining pipe insulation. Apply final coat of fitting mastic over insulating cement.
   e. For Piping 2-1/2 inches and larger: Insulate with segments of molded insulation securely wired in place and coated with skim coat of insulating cement. Apply fitting mastic, fitting tape and finish with final coat of fitting mastic.

f. Except where pre-formed, pre-finished covers are used, finish fittings, regardless of pipe size, with 4 oz canvas coated with vapor barrier adhesive.

6. Pipe Hangers:
   a. Do not allow pipes to come in contact with hangers.
   b. Provide 16 ga by 6 inch long galvanized shields at each pipe hanger to protect pipe insulation from crushing by clevis hanger.
7. Protect insulation wherever leak from valve stem or other source might drip on insulated surface, with aluminum cover or shield rolled up at edges and sufficiently large in area and of shape that dripping will not splash on surrounding insulation.

B. Below Grade Piping: Slip underground pipe insulation onto pipe and seal butt joints. Where slip-on technique is not possible, slit insulation, apply to pipe, and seal seams and joints.

END OF SECTION

SECTION 15087

REFRIGERANT PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install insulation on above ground refrigerant piping and fittings as described in Contract Documents.

B. Related Sections:
   1. Section 15184: Refrigerant Piping System.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Flexible Foamed Pipe Insulation:
   1. Thickness:
      a. 1/2 inch for one inch outside diameter and smaller pipe.
      b. 3/4 inch for 1-1/8 through 2 inch outside diameter pipe.
      c. One inch for 2-1/8 inches outside diameter and larger pipe or two layers of 1/2 inch.
      d. One inch sheet for fittings as recommended by Manufacturer.
   2. Approved Products:
      a. AP Armaflex by Armacell.
      b. Rubatex.

B. Joint Sealer:
   1. Approved Products:
      a. Armaflex 520 by Armacell.
      b. BFG Construction Adhesive No. 105.
      c. Rubatex R-373.

C. Insulation Tape:
   1. Approved Products:
      a. Armaflex AP Tape by Armacell.
      b. R-180-FS Tape by Rubatex.

D. Exterior Finish:
   1. Approved Products:
      a. WB Armaflex Finish by Armacell.
      b. Protective Coating 67x944 by Rubatex.

2.2 MANUFACTURERS

A. Contact Information:
   1. Armacell, Mebane, NC (800) 232-3341. www.armaflex.com
   2. BFG Industries, West Columbia, SC (800) 845-2220 or (803) 796-1380.
   3. Rubatex, Roanoke, VA 782-2839 or (540) 561-6000. www.rbxcorp.com

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
   1. Install insulation in snug contact with pipe and in accordance with Manufacturer's recommendations.
      a. Insulate flexible pipe connectors.
      b. Insulate thermal expansion valves with insulating tape.
      c. Insulate fittings with sheet insulation and as recommended by Manufacturer.
   2. Slip insulation on tubing before tubing sections and fittings are assembled keeping slitting of insulation to a minimum.
   3. Do not install insulation on lines through clamp assembly of pipe support. Butt insulation up against sides of clamp assembly.
   4. Stagger joints on layered insulation. Seal joints in insulation.
   5. Install insulation exposed outside building so 'slit' joint seams are placed on bottom of pipe.
   6. Paint exterior exposed insulation with two coats of specified exterior finish.

B. System Requirements:
   1. Condensing Units: Install insulation on above-ground refrigerant suction piping and fittings, including thermal bulb, from thermal expansion valve.

END OF SECTION

SECTION 15101

GENERAL PIPING REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. General piping material requirements and installation procedures applicable to all piping systems.

B. Related Sections:
   1. Section 15051: General Mechanical Requirements.

1.2 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Pipe And Pipe Fittings: Weld-O-Let and Screw-O-Let fittings are acceptable.

B. Sleeves:
   1. In Framing: Standard weight galvanized iron pipe, Schedule 40 PVC, or 14 ga galvanized sheet metal two sizes larger than bare pipe or insulation on insulated pipe.
   2. In Concrete And Masonry: Sleeves through outside walls, interior shear walls, and footings shall be schedule 80 black steel pipe with welded plate.

2.2 MANUFACTURED UNITS

A. Valves: Valves of same type shall be of same manufacturer.

B. Hangers, Rods, And Inserts
   1. Galvanized and UL approved for service intended.
   2. Hangers and accessories shall be Grinnell numbers specified or equals by B-Line.
      a. Support horizontal piping from clevis hangers or on roller assemblies with channel supports, except where trapeze type hangers are explicitly shown on Drawings. Hangers shall have double nuts.
      b. Support insulated pipes with clevis hanger equal to Grinnell Fig 260 or roller assembly equal to Grinnell Fig 171 with an insulation protection shield equal to Grinnell Fig 167. Gauge and length of shield shall be according to Grinnell design data.
      c. Except uninsulated copper pipes, support uninsulated pipes from clevis hanger equal to Grinnell Fig 260. Support uninsulated copper pipe from Grinnell Fig CT-65 copper plated hangers and otherwise fully suitable for use with copper tubing.
   3. Support rods for single pipe shall be in accordance with following table:

	Rod Diameter	Pipe Size
a.	3/8 inch	2 inches and smaller.

b. 1/2 inch 2-1/2 to 3-1/2 inches.
c. 5/8 inch 4 to 5 inches.
d. 3/4 inch 6 inches.
e. 7/8 inch 8 to 12 inches.

4. Support rods for multiple pipe supported on steel angle trapeze hangers shall be in accordance with following table:

	Rod No	Diam	Number of pipes of Sizes Listed. 2"	2-1/2"	3"	4"	5"	6"	8"
a.	2	3/8 inch	2		-	-	-	-	-
b.	2	1/2 inch	3	3	2	-	-	-	-
c.	2	5/8 inch	6	4	3	2	-	-	-
d.	2	3/4 inch	9	7	5	3	2	2	-
e.	2	7/8 inch	12	9	7	5	3	2	2

5. Size trapeze angles so bending stress is less than 10,000 psi.
6. Riser Clamps For Vertical Piping: Grinnell Figure 261.
7. Concrete Inserts:
   a. Grinnell Figure 282.
   b. Suitable for special nuts size 3/8 inch through 7/8 inch with yoke to receive concrete reinforcing rods, and with malleable iron lugs for attaching to forms.
   c. Continuous inserts shall be Unistrut P-3200 series.
8. Steel Deck Bracket: Unistrut P1000 with clamp nut, minimum 6 inch length.

2.3 MANUFACTURERS

A. Contact Information:
1. B-Line Systems, Highland, IL (800) 280-7994 or (618) 654-2184. www.bline.com
2. EPCO Products Inc, Fort Wayne, IN (800) 879-3726 or (219) 747-8888. www.epcoproducts.com
3. Globe Pipe Hanger Products Inc, Cleveland, OH (800) 338-3555 or (216) 362-6300.
4. Grinnell Corp, Exeter, NH (603) 778-9200 www.grinnell.com.
5. Michigan Hanger Company, Niles, OH (800) 333-0852 or (330) 544-4700.
6. Superstrut by Thomas & Betts, Memphis, TN (800) 888-0211 or (901) 682-7766. www.tnb.com
7. Victaulic Company of America, Easton, PA (610) 559-3300 www.victualic.com.
8. Watts Regulator Co, North Andover, MA (978) 688-1811. www.wattsreg.com

PART 3 - EXECUTION

3.1 INSTALLATION

A. Interface With Other Work:
1. Furnish sleeves, inserts, supports, and equipment that are to be installed by others in sufficient time to be incorporated into construction as work proceeds. Locate these items and see they are properly installed.

B. Furnish and install complete system of piping, valved as indicated or as necessary to completely control entire apparatus.
1. Pipe drawings are diagrammatic and indicate general location and connections. Piping may have to be offset, lowered, or raised as required or directed at site. This does not relieve this Division from responsibility for proper erection of systems of piping in every respect.
2. Arrange piping to not interfere with removal of other equipment, ducts, or devices, or block access to doors, windows, or access openings.
   a. Arrange so as to facilitate removal of tube bundles.
   b. Provide accessible flanges or ground joint unions, as applicable for type of piping specified, at connections to equipment and on bypasses.
      1) Make connections of dissimilar metals with di-electric unions.
      2) Install valves and unions ahead of traps and strainers. Provide unions on both sides of traps.

c. Do not use reducing bushings, street elbows, bull head tees, close nipples, or running couplings.
d. Install piping systems so they may be easily drained. Provide drain valves at low points and manual air vents at high points in hot water heating and cooling water piping.
e. Install piping to insure noiseless circulation.
f. Place valves and specialties to permit easy operation and access. Valves shall be regulated, packed, and glands adjusted at completion of work before final acceptance.

3. Do not install piping in shear walls.

C. Properly support piping and make adequate provisions for expansion, contraction, slope, and anchorage.
1. Cut piping accurately for fabrication to measurements established at site. Remove burr and cutting slag from pipes.
2. Work piping into place without springing or forcing. Make piping connections to pumps and other equipment without strain at piping connection. Remove bolts in flanged connections or disconnect piping to demonstrate that piping has been so connected, if requested.
3. Make changes in direction with proper fittings.
4. Except for underground pipe, suspend piping from roof trusses or clamp to vertical walls using Unistrut and clamps. Do not hang pipe from other pipe, equipment, or ductwork. Laying of piping on any building element is not allowed.
5. Supports For Horizontal Piping:
a. Support metal piping at 96 inches mm on center maximum for pipe 1-1/4 inches or larger and 72 inches on center maximum for pipe 1-1/8 inch or less.
b. Support thermoplastic pipe at 48 inches on center maximum.
c. Provide support at each elbow. Install additional support as required.
6. Supports for Vertical Piping:
a. Place riser clamps at each floor or ceiling level.
b. Securely support clamps by structural members, which in turn are supported directly from building structure.
c. Provide clamps as necessary to brace pipe to wall.

D. Provide sleeves around pipes passing through concrete or masonry floors, walls, partitions, or structural members. Do not place sleeves around soil, waste, vent, or roof drain lines passing through concrete floors on grade. Seal sleeves with specified sealants.
1. Sleeves through floors shall extend 1/4 inch above floor finish in mechanical equipment rooms above basement floor. In other rooms, sleeves shall be flush with floor.
2. Sleeves through floors and foundation walls shall be watertight.

E. Provide spring clamp plates (escutcheons) where pipes run through walls, floors, or ceilings and are exposed in finished locations of building. Plates shall be chrome plated heavy brass of plain pattern and shall be set tight on pipe and to building surface.

3.2 FIELD QUALITY CONTROL

A. Site Tests:
1. Perform tests on mechanical piping systems. Furnish devices required for testing purposes.
2. Replace material or workmanship proven defective with sound material at no additional cost to Owner. Repeat tests on new material, if requested.

3.3 CLEANING

A. Remove dirt, grease, and other foreign matter from each length of piping before installation.
1. After each section of piping used for movement of water or steam is installed, flush with clean water, except where specified otherwise.
2. Arrange temporary flushing connections for each section of piping and arrange for flushing total piping system.

3. Provide temporary cross connections and water supply for flushing and drainage and remove after completion of work.

3.4 PROTECTION

A. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system. Cap or plug open ends of pipes and equipment to keep dirt and other foreign materials out of system. Do not use plugs of rags, wool, cotton waste, or similar materials.

END OF SECTION

SECTION 15120

POTABLE WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install miscellaneous potable water piping specialties as described in Contract Documents.

B. Related Sections:
   1. Section 15101: General Piping Requirements.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Pressure Reducing Station:
   1. Pressure Gauges:
      a. Gauges shall have following features:
         1) Cast aluminum case.
         2) Chrome plated ring.
         3) Clear glass window.
         4) Phosphor bronze alloy steel bourdon tube.
         5) 1/2 percent scale range accuracy.
         6) 4-1/2 inch diameter dial face.
         7) Range 0 to 100 psig.
      b. Quality Standard: 500 by HO Trerice.
      c. Approved Manufacturers:
         1) HO Trerice.
         2) Marsh.
         3) Weiss.
   2. Brass Gauge Cocks:
      a. Approved Products:
         1) 1092 by Ashcroft.
         2) 123 by Ernst.
         3) 865 by HO Trerice.
         4) 557 by Walworth.

2.2 MANUFACTURERS

A. Contact Information:
   1. Ashcroft, Stratford, CT (203) 385-0612. www.halliburton.com
   2. John C Ernst Co Inc, Dover, NJ (888) 463-7678 or (973) 989-0300. www.john-ernst.com
   3. HO Trerice, Oak Park, MI (800) 877-1236 or (248) 399-8000. www.hotco.com
   4. Marsh/Marshalltown Instruments, Hastings, NE (402) 463-3390. www.marshbellofram.com
   5. Sioux Chief.
   6. Walworth Company, Houston, TX (800) 735-6007 or (713) 777-7788. www.walworthvalve.com
   7. Watts.
   8. Weiss Instruments Corp, West Babylon, NY (516) 752-1655. www.weissinstruments.com

PART 3 - EXECUTION

3.1 INSTALLATION

A. Gauges: Connect to pipe with 1/4 inch connections utilizing gauge cocks.

END OF SECTION

SECTION 15141

POTABLE WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Perform excavating and backfilling required by work of this Section.
   2. Furnish and install potable water piping complete with necessary valves, connections, and accessories inside building and connect with outside utility lines 5 feet from building perimeter as described in Contract Documents.

B. Related Sections:
   1. Section 15083: Potable Water Piping Insulation.
   2. Section 15101: General Piping Requirements.

1.2 REFERENCES

A. American Society For Testing And Materials:
   1. ASTM B 88-99, 'Standard Specification for Seamless Copper Water Tube.'

1.3 SUBMITTALS

A. Quality Assurance / Control: Written report of sterilization test.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Pipe:
   1. Above-Grade: Copper meeting requirements of ASTM B 88, Type L.
   2. Below-Grade.
      a. Copper meeting requirements of ASTM B 88, Type K. 3/4 inch minimum under slabs.
         1) 2 inches And Smaller: Annealed soft drawn.
         2) 2-1/2 inches And Larger: Hard Drawn.

B. Fittings: Wrought copper.

C. Connections:
   1. Above-Grade:
      a. Sweat copper type with 95/5 or 96/4 Tin-Antimony solder, Bridgit solder, or Silvabrite 100 solder. Use only lead-free solder.
      b. Viega ProPress System
   2. Below Grade:
      a. Copper:
         1) Brazed using following type rods:
            a) Copper to Copper Connections:
               (1) AWS Classification BCuP-4 Copper Phosphorus (6 percent silver).
               (2) AWS Classification BCuP-5 Copper Phosphorus (15 percent silver).
            b) Copper to Brass or Copper to Steel Connections: AWS Classification BAg-5 Silver (45 percent silver).

c) Do not use rods containing Cadmium.
2) Brazing Flux:
a) Approved Products:
(1) Stay-Silv white brazing flux by J W Harris.
(2) High quality silver solder flux by Handy & Harmon.
3) Joints under slabs acceptable only if allowed by local codes.

D. Ball Valves:
1. Use ball valves exclusively unless otherwise specified. Ball valves shall be by single manufacturer from approved list below.
2. Valves shall be two-piece, full port for 150 PSI SWP.
a. Operate with flow in either direction, suitable for throttling and tight shut-off. Full port, three-piece maintenance design.
b. Body: Bronze, 150 psig wsp at 350 deg F and 400 psig wog.
c. Seat: Bubble tight at 100 psig under water.
3. Quality Standard: Nibco T585 or S585, S595
4. Approved Manufacturers:
a. ConBraCo 'Apollo.'
b. Hammond.
c. Milwaukee.
d. Nibco.
e. Watts.
f. Honeywell-Braukmann.
g. Jenkins.
h. Stockham.

E. Combination Pressure Reducing Valve / Strainer:
1. Integral stainless steel strainer, or separate 'Y' strainer installed upstream of pressure reducing valve.
2. Built-in thermal expansion bypass check valve.
3. Quality Standard: Watts U5B.
4. Approved Products:
a. Cash Valve.
b. Cla-Val: Hi Capacity.
c. Con Braco: 36C.
d. Honeywell-Braukmann.
e. Spence: Hi Capacity.
f. Watts.
g. Wilkins.

2.2 MANUFACTURERS

A. Contact Information:
1. Armstrong.
2. Bell & Gossett.
3. Cash Valve, Cullman, AL (256) 775-8200. www.cashacme.com
4. Cla-Val Company, Costa Mesa, CA (800) 942-6326 or (949) 722-4800 www.cla-val.com.
5. ConBraco Industries Inc, Matthews, NC (704) 841-6000 www.conbraco.com.
6. Hammond Valve, Prairie Du Sac, WI (800) 348-6544 or (608) 643-2977. www.hammondvalve.com
7. Handy & Harmon Products Div, Fairfield, CT (800) 245-2728 or (203) 259-8321 www.handyharmon.com.
8. J W Harris Co Inc, Cincinnati, OH (800) 733-4533 or (513) 891-2000. www.jwharris.com
9. Honeywell-Braukmann (Honeywell Ltd), Scarborough, ON (416) 293-8111. www.honeywell.ca/braukmann
10. Jenkins Valves Inc, Bolingbrook, IL (800) 241-6560 or (630) 226-4900. www.cranevalve.com
11. Milwaukee Valve Co, Milwaukee, WI (414) 744-5240. www.milwaukeevalve.com
12. Mueller Co, Decatur, IL (217) 423-4471 www.muellerflo.com.

13. Nibco Inc, Elkhart, IN (800) 642-5463 or (219) 295-3000. www.nibco.com
14. Spence Engineering Co, Walden, NY (800) 398-2493 or (914) 778-5566. www.spenceengineering.com
15. Stockham Valves, Birmingham, AL (800) 786-2542 or (205) 592-6361. www.stockham.com
16. Taco.
17. Tour & Anderson.
18. Viega ProPress, Elyria, OH (440) 323-5581. www.propresssystem.com
19. Watts Regulator Co, Andover, MA (978) 688-1811. www.wattsreg.com
20. Wilkins Operation, Paso Robles, CA (805) 238-7100. www.zurn.com

PART 3 - EXECUTION

3.1 INSTALLATION

A. Below Grade:
   1. Install piping under slabs without joints where possible.
   2. Insulate water piping buried within building perimeter.
   3. Bury water piping 6 inches minimum below bottom of slab and encase in 2 inches minimum of sand.

B. Locate cold water lines a minimum of 6 inches from hot water line.

3.2 FIELD QUALITY CONTROL

A. Site Tests: Before pipes are covered, test systems in presence of Architect at 125 psi hydrostatic pressure for 4 hours and show no leaks. Disconnect equipment not suitable for 125 psig pressure from piping system during test period.

3.3 CLEANING

A. Sterilize potable water system with solution containing 200 parts per million minimum of available chlorine and maintaining pH of 7.5 minimum. Introduce chlorinating materials into system in manner approved by Architect. Allow sterilization solution to remain for 24 hours and open and close valves and faucets several times during that time.

B. After sterilization, flush solution from system with clean water until residual chlorine content is less than 0.2 parts per million.

C. Water system will not be accepted until negative bacteriological test is made on water taken from system. Repeat dosing as necessary until such negative test is accomplished.

END OF SECTION

SECTION 15150

SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install soil, waste, and vent piping systems within building and connect with outside utility lines 5 feet out from building where applicable.
   2. Perform excavation and backfill required by work of this Section.

B. Related Sections:
   1. Section 15101: General Piping Requirements.

1.2 REFERENCES

A. American Society For Testing And Materials:
   1. ASTM D 2235-96a, 'Standard Specification for Solvent Cement for ABS Plastic Pipe and Fittings.'
   2. ASTM D 2321-00, 'Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.'
   3. ASTM F 628-00, 'Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings with a Cellular Core.'

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Minimum size of waste piping installed under floor slab on grade shall be 2 inches.

B. Piping And Fittings: ABS Schedule 40 cellular core plastic pipe and pipe fittings meeting requirements of ASTM F 628, joined with pipe cement meeting requirements of ASTM 2235.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Excavate and backfill as specified in Section 02315 with following additional requirements:
   1. Runs shall be as close as possible to those shown on Drawings.
   2. Excavate to required depth and grade to obtain fall required. Grade soil and waste lines within building perimeter 1/4 inch fall in one foot in direction of flow.
   3. Bottom of trenches shall be hard. Tamp as required.
   4. Remove debris from trench before laying of pipe.
   5. Do not cut trenches near footings without consulting Architect.

B. Thermoplastic Pipe And Fittings:
   1. General: Piping and joints shall be clean and installed according to Manufacturer's recommendations. Break down contaminated joints, clean seats and gaskets and reinstall.
   2. Above Grade: Locate pipe hangers every 4 feet on center maximum and at elbows.
   3. Below Grade:
      a. Install in accordance with Manufacturer's recommendations and ASTM D 2321.

b. Stabilize unstable trench bottoms.
c. Bed pipe true to line and grade with continuous support from firm base.
   1) Bedding depth: 4 to 6 inches.
   2) Material and compaction to meet ASTM standard noted above.
d. Excavate bell holes into bedding material so pipe is uniformly supported along its entire length. Blocking to grade pipe is forbidden.
e. Trench width at top of pipe:
   1) Minimum: 18 inches or diameter of pipe plus 12 inches, whichever is greater.
   2) Maximum: Outside diameter of pipe plus 24 inches.
f. Do not use backhoe or power equipment to assemble pipe.
g. Initial backfill shall be 12 inches above top of pipe with material specified in referenced ASTM standard.
h. Minimum cover over top of pipe not under building slab:
   1) 36 inches before wheel loading.
   2) 48 inches before compaction.

C. Install piping so cleanouts may be installed as follows:
1. Where shown on Drawings and near bottom of each stack and riser.
2. At every 135 degrees of accumulative change in direction for horizontal lines.
3. Every 100 feet of horizontal run.
4. Extend piping to accessible surface. Do not install piping so cleanouts must be installed in carpeted floors. In such locations, configure piping so wall type cleanouts may be used.

D. Each fixture and appliance discharging water into sanitary sewer or building sewer lines shall have seal trap in connection with complete venting system so gasses pass freely to atmosphere with no pressure or syphon condition on water seal.

E. Vent entire waste system to atmosphere. Join lines together in fewest practicable number before projecting above roof. Set back vent lines so they will not pierce roof near edge or valley. Vent line terminations shall be:
1. 6 inches minimum above roof and 12 inches minimum from any vertical surface.
2. Same size as vent pipe.
3. In areas where minimum design temperature is below 0 deg F or where frost or snow closure may be possible:
   a. Vent line terminations shall be same size as vent pipe, except no smaller than 2 inches in diameter.
   b. Vents shall terminate 10 inches minimum above roof or higher if required by local codes.

F. Furnish and install firestopping at penetrations of fire-rated structures as required under Sections 07840 and 15051.

3.2 FIELD QUALITY CONTROL

A. Site Tests:
1. Conduct tests for leaks and defective work. Notify Architect before testing.
2. Thermoplastic Pipe System:
   a. Before backfilling and compacting of trenches, cap all open ends and pressure test to 10 ft. water column for 4 hours with no leaks. Correct leaks and defective work.
   b. After backfilling and compacting of trenches is complete but before placing floor slab, re-test as specified above. Uncover pipe and correct leaks and defective work. Re-backfill and compact and re-test.

END OF SECTION

SECTION 15181

CONDENSATE DRAIN PIPING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install condensate drain piping as described in Contract Documents.

B. Related Sections:
   1. Section 15101: General Piping Requirements

PART 2 - PRODUCTS

2.1 MATERIALS

A. Condensate Drains:
   1. Schedule 40 PVC for condensate drains from furnace combustion chambers and furnace cooling coils.
   2. 3 inch deep seal, vented water trap adjacent to cooling coil connection.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Condensate Drains:
   1. Support piping and protect from damage.
   2. Do not combine PVC condensate drain piping from furnace combustion chamber with copper condensate drain piping from cooling coil.

END OF SECTION

SECTION 15184

REFRIGERANT PIPING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install piping and specialties for refrigeration systems as described in Contract Documents.

B. Related Sections:
   1. Section 15084: Refrigerant Piping Insulation.
   2. Section 15101: General Piping Requirements.

1.2 REFERENCES

A. American National Standards Institute / American Welding Society.
   1. ANSI / AWS A5.8-92, 'Standard Specification for Brazing Alloys.'

B. American Society For Testing And Materials:
   1. ASTM A 36-00a, 'Standard Specification for Carbon Structural Steel.'
   2. ASTM A 361-94, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process for Roofing and Siding.'
   3. ASTM B 280-99, 'Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.'

1.3 SUBMITTALS

A. Shop Drawings: Show each individual equipment and piping support.

B. Quality Assurance / Control: Technician certificate for use of CFC and HCFC refrigerants.

1.4 QUALITY ASSURANCE

A. Qualifications: Refrigerant piping shall be installed by a refrigeration contractor licensed by State and by technicians certified in use of CFC and HCFC refrigerants.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Refrigerant Piping:
   1. Meet requirements of ASTM B 280, hard drawn straight lengths. Soft copper tubing not permitted.
   2. Do not use pre-charged refrigerant lines.

B. Refrigerant Fittings:
   1. Wrought copper with long radius elbows.
   2. Approved Manufacturers:
      a. Mueller Streamline.

b. Nibco Inc.
c. Grinnell.
d. Elkhart.

C. Suction Line Traps:
1. Manufactured standard one-piece traps.
2. Approved Manufacturers:
a. Mueller Streamline.
b. Nibco Inc.
c. Grinnell.
d. Elkhart.

D. Connection Material:
1. Brazing Rods in accordance with ANSI / AWS A5.8:
a. Copper to Copper Connections:
1) Classification BCuP-4 Copper Phosphorus (6 percent silver).
2) Classification BCuP-5 Copper Phosphorus (15 percent silver).
b. Copper to Brass or Copper to Steel Connections: Classification BAg-5 Silver (45 percent silver).
c. Do not use rods containing Cadmium.
2. Flux:
a. Approved Products:
1) Stay-Silv White Brazing Flux by J W Harris.
2) High quality silver solder flux by Handy & Harmon.

E. Valves:
1. Expansion Valves:
a. For pressure type distributors, externally equalized with stainless steel diaphragm, and same refrigerant in thermostatic elements as in system.
b. Size valves to provide full rated capacity of cooling coil served. Coordinate selection with evaporator coil and condensing unit.
c. Approved Manufacturers:
1) Alco.
2) Henry.
3) Mueller.
4) Parker.
5) Sporlan.
2. Manual Refrigerant Shut-Off Valves:
a. Ball valves designed for refrigeration service and full line size.
b. Valve shall have cap seals.
c. Valves with hand wheels are not acceptable.
d. Provide service valve on each liquid and suction line at compressor.
e. If service valves come as integral part of condensing unit, additional service valves shall not be required.
f. Approved Manufacturers:
1) Henry.
2) Mueller.
3) Superior.
4) Virginia.

F. Filter-Drier:
1. On lines 3/4 inch outside diameter and larger, filter-drier shall be replaceable core type with Schraeder type valve.
2. On lines smaller than 3/4 inch outside diameter, filter-drier shall be sealed type using brazed copper fittings.
3. Size shall be full line size.
4. Approved Manufacturers:
a. Alco.
b. Mueller.

c. Parker.
d. Sporlan.
e. Virginia.

G. Sight Glass:
1. Combination moisture and liquid indicator with protection cap.
2. Sight glass shall be full line size.
3. Sight glass connections and sight glass body shall be solid copper or brass, no copper-coated steel sight glasses allowed.
4. Approved Manufacturers:
a. Alco.
b. Sporlan.
c. Other as approved.

H. Flexible Connectors:
1. Designed for refrigerant service with bronze seamless corrugated hose and bronze braiding.
2. Approved Products:
a. Vibration Absorber Model VAF by Packless Industries.
b. Vibration Absorbers by Virginia KMP Corp.
c. Anaconda 'Vibration Eliminators' by Universal Metal Hose.
d. Style 'BF' Spring-flex freon connectors by Vibration Mountings.

2.2 MATERIALS

A. Refrigerant Piping Supports:
1. Base, Angles, And Uprights: Steel meeting requirements of ASTM A 36.
2. Securing Channels:
a. At Free-Standing Pipe Support:
1) Acceptable Products:
a) P-1000 channels by Unistrut.
b) HS-158-12 channels by Hilti.
c) Equal as approved by Architect prior to installation. See Section 01600.
b. At Wall Support:
1) Acceptable Products:
a) P-3300 channels by Unistrut.
b) HS-1316-12 channels by Hilti.
c) Equal as approved by Architect prior to installation. See Section 01600.
c. At Suspended Support:
1) Acceptable Products:
a) P-1001 channels by Unistrut.
b) MS-41 channels by Hilti.
c) Equal as approved by Architect prior to installation. See Section 01600.
3. Angle Fittings:
a. Acceptable Products:
1) P-2626 90 degree angle by Unistrut.
2) MW2 angle by Hilti.
3) Equal as approved by Architect prior to installation. See Section 01600.
4. Pipe Clamps:
a. Acceptable Manufacturers:
1) Hilti Cush-A-Clamp.
2) Hydra-Zorb.
3) Klo-Shure coupling
4) ZSI Cush-A-Clamp.
5) Equal as approved by Architect prior to installation. See Section 01600.
5. Protective Cover: 18 ga steel, hot-dipped galvanized to meet requirements of ASTM A 361, 1.25 oz/sq ft.

2.3 MANUFACTURERS

A. Contact Information:
1. Alco Controls Div, Maryland Heights, MO (314) 569-4500. www.alcocontrols.com
2. Cush-A-Clamp by ZSI Manufacturing, Westland, MI (800) 323-7053 or (734) 467-1716. www.cushaclamp.com
3. Elkhart Products Corp, Elkhart, IN (219) 264-3181. www.elkhartproducts.com
4. Grinnell Corp, Exeter, NH (888) 610-6101 or (630) 787-6100. www.grinnell.com
5. Handy & Harmon Products Division, Fairfield, CT (800) 245-2728 or (203) 259-8321. www.handyharmon.com
6. J W Harris Co Inc, Cincinnati, OH (800) 733-4533 or (513) 891-2000. www.jwharris.com
7. Henry Valve Co, Melrose Park, IL (800) 964-3679 or (708) 344-1100. www.paulsenpartners.com/henry-valve/
8. Hilti Inc, Tulsa, OK (800) 879-8000 or (918) 252-6000. www.hilti.com
9. Hydra-Zorb Co, Auburn Hills, MI (248) 373-5151. www.hydra-zorb.com
10. Klo-Shure, Royal Oak, MI (248) 373-6250 www.klo-shure.com
11. Mueller Steam Specialty, St Pauls, NC (877) 831-9464 or (910) 865-8241. www.muellersteam.com
12. Nibco Inc, Elkhart, IN (800) 642-5463 or (219) 295-3000. www.nibco.com
13. Packless Industries, Waco, TX (800) 347-4859 or (254) 666-7700. www.packless.com
14. Parker Hannefin Corp, Cleveland, OH (216) 896-3000. www.parker.com/cig/
15. Sporlan Valve Co, Washington, MO (314) 239-1111.
16. Superior Refrigeration Products, Washington, PA (724) 225-8000. www.superiorvalve.com
17. Unistrut Corp, Wayne, MI (800) 521-7730 or (313) 721- 4040. www.unistrut.com
18. Universal Metal Hose, Chicago, IL (800) 638-4673 or (773) 277-0700. www.universalmetalhose.com
19. Vibration Mountings & Controls, Bloomingdale, NJ (800) 569-8423 or (973) 838-1780. www.vmc-kdc.com
20. Virginia KMP Corp, Dallas, TX (800) 285-8567 or (214) 330-7731. www.virginiakmp.com

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refrigerant Lines:
1. Install as high in upper mechanical areas as possible. Do not install underground or in tunnels.
2. Slope suction lines down toward compressor one inch/10 feet. Locate traps at vertical rises against flow in suction lines.

B. Connections:
1. Refrigeration system connections shall be copper-to-copper, copper-to-brass, or copper-to-steel type properly cleaned and brazed with specified rods. Use flux only where necessary. No soft solder (tin, lead, antimony) connections will be allowed in system.
2. Braze manual refrigerant shut-off valve, sight glass, and flexible connections.
3. Circulate dry nitrogen through tubes being brazed to eliminate formation of copper oxide during brazing operation.

C. Specialties:
1. Install valves and specialties in accessible locations. Install refrigeration distributors and suction outlet at same end of coil.
2. Install thermostatic bulb as close to cooling coil as possible. Do not install on vertical lines.
3. Install equalizing line in straight section of suction line, downstream of and reasonably close to thermostatic bulb. Do not install on vertical lines.
4. Provide flexible connectors in each liquid line and suction line at both condensing unit and evaporator on systems larger than five tons. Anchor pipe near each flexible connector.

D. Refrigerant Supports:

1. Support Spacing:
   a. Piping 1-1/4 inch And Larger: 8 feet on center maximum.
   b. Piping 1-1/8 inch And Smaller: 6 feet on center maximum.
   c. Support each elbow.
2. Isolate pipe from supports and clamps with Hydrozorb or Cush-A-Clamp systems.
3. Run protective cover continuous from condensing units to risers or penetrations at building wall.

3.2 FIELD QUALITY CONTROL

A. Make evacuation and leak tests in presence of Architect's Engineer after completing refrigeration piping systems. Positive pressure test will not suffice for procedure outlined below.
   1. Draw vacuum on each entire system with two stage vacuum pump. Draw vacuum to 300 microns using micron vacuum gauge capable of reading from atmosphere to 10 microns. Do not use cooling compressor to evacuate system nor operate it while system is under high vacuum.
   2. Break vacuum with nitrogen and re-establish vacuum test. Vacuum shall hold for 30 minutes at 300 microns without vacuum pump running.
   3. Conduct tests at 70 deg F ambient temperature minimum.
   4. Do not run systems until above tests have been made and systems started up as specified. Inform Owner's Representative of status of systems at time of final inspection and schedule start-up and testing if prevented by outdoor conditions before this time.
   5. After testing, fully charge system with refrigerant and conduct test with Halide Leak Detector.
   6. Recover all refrigerant in accordance with applicable codes. Do not allow any refrigerant to escape to atmosphere.

B. If it is observed that refrigerant lines are being or have been brazed without proper circulation of nitrogen through lines, all refrigerant lines installed up to that point in time shall be removed and replaced at no additional cost to Owner.

END OF SECTION

SECTION 15196

NATURAL GAS PIPING SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Perform excavation and backfill required for work of this Section.
   2. Furnish and install gas piping and fittings within building and from building to meter including connection to meter as described in Contract Documents.

B. Related Sections:
   1. Section 15101: General Piping Requirements.

1.2 REFERENCES

A. American Society For Testing And Materials:
   1. ASTM A 53-01, 'Standard Specification for Pipe, Steel and Hot-Dipped, Zinc-Coated, Welded and Seamless.'
   2. ASTM A 234-00a, 'Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperature Service.'
   3. ASTM D 2513-00, 'Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.'

1.3 QUALITY ASSURANCE

A. Qualifications:
   1. Welders shall be certified and bear evidence of certification 30 days before commencing work on project. If there is doubt as to proficiency of welder, Owner's Representative may require welder to take another test. This shall be done at no cost to Owner. Certification shall be by Pittsburgh Testing Laboratories or other approved authority.
   2. Polyethylene pipe installers shall be properly trained and certified in procedure for joining polyethylene pipe.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Do not store polyethylene pipe so it is exposed to sunlight.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Above-Ground Pipe And Fittings: Black carbon steel, butt welded, Schedule 40 pipe meeting requirements of ASTM A 53. Welded forged steel fittings meeting requirements of ASTM A 234 or standard weight malleable iron screwed.

B. Below-Ground Pipe And Fittings: Polyethylene pipe and fittings meeting requirements of ASTM D 2513 with No. 14 coated copper trace wire.

2.2 MANUFACTURED UNITS

A. Valves:
   1. 125 psi bronze body ball valve, UL listed.
   2. Approved Products:
      a. Apollo Series 80-100 by ConBraCo.
      b. FIG-30-A by Jenkins Valves.
      c. Model T-204 by Jomar International.
      d. 3410 by McDonald Valves & Fittings.
      e. BCI-100T (with tee handle) by Milwaukee Valve.
      f. 'Red Cap' gas ball valve by PGL Corp.
      g. Model B-6000-UL by Watts Regulator.

B. Cocks:
   1. Gauge Cocks: Conbraco 41-560 bronze gauge cock.
   2. Lubricated Balancing Cocks:
      a. Square head type suitable for 175 psig wog at 150 deg F.
      b. Wrench handle for each valve.
      c. 2 inches And Smaller:
         1) Cast iron body with screwed connections.
         2) Approved Products:
            a) Powell: 2200.
            b) Walworth: 1796.
      d. 2-1/2 to 5 inches:
         1) Cast iron body with flanged connections.
         2) Approved Products:
            a) Powell: 2201.
            b) Walworth: 1797F.
      e. 6 inches And Larger:
         1) Cast iron body with flanged connections.
         2) Approved Products:
            a) Powell: 2201.
            b) Walworth: 1718F.

C. Flexible Connector:
   1. Type 304 stainless steel corrugated tube coated for corrosion protection.
   2. Approved Manufacturers and Models:
      a. Dormont Series 41.
      b. Brass Craft Procoat.

2.3 MANUFACTURERS

A. Contact Information:
   1. ConBraCo Industries, Inc, Matthews, NC (704) 841-6000 www.conbraco.com.
   2. Dormont Manufacturing Company, Export, PA (724) 733-4800.
   3. Jenkins Valves Inc, Bolingbrook, IL (800) 241-6560. www.cranevalve.com
   4. Jomar International, Madison Heights, MI (800) 325-5690. www.jo-mar.com
   5. KOSO by Pacific Seismic Products Inc, Lancaster, CA (800) 442-7633 or (661) 942-4499. www.psp4gasoff.com
   6. McDonald Valves & Fittings Inc, Oklahoma City, OK (405) 631-0808.
   7. Milwaukee Valve Co, Milwaukee, WI (414) 744-5240. www.milwaukeevalve.com
   8. Powell Valves, Cincinnati, OH (513) 852-2000. www.powellvalves.com
   9. Quake Master, Fullerton, CA (800) 338-8701 or (918) 227-4535.
   10. 'Red Cap' gas ball valve by PGL Corp.
   11. Walworth Company, Houston, TX (800) 735-6007 or (713) 777-7788. www.walworthvalve.com
   12. Watts Regulator Co, North Andover, MA (978) 688-1811. www.wattsreg.com.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Steel pipe installed through air plenums, in walls, and pipes 2-1/2 inches and larger shall have welded fittings and joints. Other steel pipe may have screwed or welded fittings.

B. Lay underground pipe in accordance with Manufacturer's recommendations and local gas utility company regulations and specifications.
   1. Provide 24 inch minimum steel pipe between vertical rise of riser and end of polyethylene line if anode-less riser is not used. Use plastic-to-steel transition or compression fitting between end of polyethylene line and steel meter riser. Provide cathodic protection for steel riser or use anode-less riser.
   2. Place tracer wire along side of polyethylene pipe from meter to point where pipe rises inside building.
   3. Place 4 inches of sand around gas line buried underground.
   4. Do not install gas piping under building floor slabs-on-grade.

C. On lines serving gas-fired equipment, install gas cocks adjacent to equipment outside of equipment cabinet and easily accessible.

D. Install 6 inch long minimum dirt leg, with pipe cap, on vertical gas drop serving each gas-fired equipment unit.

E. Use fittings for changes of direction in pipe and for branch runouts.

3.2 FIELD QUALITY CONTROL

A. Site Tests: Before pipes are buried or concealed from view, test systems in Architect's presence at 60 psig for 4 hours and show no drop in pressure.

END OF SECTION

SECTION 15410

PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install plumbing fixtures as described in Contract Documents.

B. Related Sections:
   1. Section 15051: General Mechanical Requirements.
   2. Section 15141: Potable Water Piping System.

PART 2 - PRODUCTS

2.1 GENERAL

A. Interior exposed pipe, valves, and fixture trim, including trim behind custom casework doors, shall be chrome plated.

B. Do not use flexible water piping.

C. Flow Control Fittings: Vandal proof type and fit faucet spout of fixture used. Flow shall be controlled as required by local codes.

2.2 MANUFACTURED UNITS

A. Water Closets:
   1. Maximum water usage of 1.6 gallons per flush.
   2. Handicap Accessible Fixture:
      a. 18 inch maximum rim height.
      b. Approved Products:
         1) American Standard: Elderly New Cadet 'Aquameter' Combination Elongated 2377.100.
         2) Crane:
            a) Economiser (Elongated) 3-818.
            b) VIP 3-999.
         3) Eljer: 'Aqua-Saver' 091-7045.
         4) Kohler: Highline Elongated 'Lite' K-3544 K-3458.
         5) Toto: 'ADA Drake' CST744SL.
   3. Seats:
      a. Provide split front type with check hinge.
      b. Approved Products:
         1) Standard And Handicap Accessible Fixtures:
            a) Bemis: 1655-C.
            b) Beneke Corporation: Series 527 – CH.
            c) Church: No. 9500-C.
            d) Kohler: K-4666-C.
            e) Olsonite: 95CC.
            f) Toto SC534.
   4. Supply Pipe And Stop:
      a. Provide stuffing box and chrome plating.
      b. Approved Products:

1) Brass Craft: TCR 1912 DL-CP.
2) Zurn: Z8804-LR-PC.

B. Handicap Accessible Lavatories:
1. Self Supporting Fixture:
a. Size: 20 by 27 inches.
b. Carrier / Support:
1) Approved Manufacturers:
a) Josam.
b) J. R. Smith.
c) Wade.
d) Watts Drainage Brass And Tubular
e) Zurn.
c. Approved Products:
1) American-Standard: Wheelchair Lavatory 9141.011.
2) Crane: 1H-364-V.
3) Eljer: Wheelchair 051-2964.
4) Kohler: Morningside K-12636.
5) Toto: LT308.
2. Fittings:
a. Faucet And Drain:
1) Approved Products:
a) American Standard: 5502.170.
b) Cambridge Brass: 21T344.
c) Chicago: 1802A-E3-317.
d) Delta: 2523 HDF.
e) Grohe: 20831660 8-inch center faucet, 4-inch blade handle, and drain.
f) Kohler: K-7404-5-A with K-13885 drain.
g) Sloan: Polaris SL-890
h) Speakman: SC-3075-ADA.
i) T & S Brass: B-890.
j) Zurn: Z-81104.
b. Supply pipes with stops:
1) Provide stuffing box and chrome plating.
2) Approved Products:
a) Brass Craft: TCR 1912 A-CP.
b) Zurn: Z8804 LR-PC.
c. Traps:
1) 17 ga tube 'P' trap, chrome plated.
2) Approved Manufacturers:
a) Dearborn.
b) Keeney Manufacturing.
c) Watts Drainage Brass And Tubular
d) Zurn Traps & Supplies.
3. Safety Covers:
a. Provide protection on water supply pipes and on trap.
b. Approved Products:
1) Trapwrap by Brocar Products Inc.
2) Pro Wrap by McGuire Products.
3) Handy-Shield by Plumberex Specialty Products.
4) Handi Lav-Guard by TrueBro.
5) Zurn Traps & Supplies.

C. Service Sink:
1. Fixture:
a. Floor Type, 28 inches square with vinyl coated rim guard or 24 inches square with Stainless Steel rim guard.
b. Approved Products:
1) Eljer: Custodial 242-0050.
2) Kohler: Whitby K-6710.

3) Stern-Williams: Cornaro SBC-1502.

2. Fittings:
   a. Supply:
      1) Mounting height of 42 inches.
      2) Provide 48 inch hose and clamp unless spout is threaded.
      3) Approved Products:
         a) American Standard: 8344.112 with threaded spout.
         b) Cambridge Brass: 28T2383CB.
         c) Chicago: 897.
         d) Fiat: No. 830AA.
         e) Grohe: 31417000 and 13121000.
         f) Kohler: K-8928.
         g) Sloan: Polaris SL-665-BSTR
         h) Speakman: SC-5811 RCP-5H.
         i) T & S Brass: B-665-BSTR.
         j) Zurn: Z-841M1.
   b. Drain and Strainer:
      1) Approved Products:
         a) American Standard: 7721.038.
         b) Eljer: 803-0630.
         c) Kohler: K-9146, 3 inch IPS.
   c. Trap: Cast iron, PVC, or ABS to match piping.

D. Hydrants:
   1. Freeze proof wall hydrant.
   2. Provide with integral anti-siphon device.
   3. Approved Manufacturers:
      a. Josam.
      b. J. R. Smith.
      c. Mifab.
      d. Wade.
      e. Watts Drainage.
      f. Woodford.
      g. Zurn.

E. Drains And Drain Accessories:
   1. Floor Drain FD-1:
      a. Approved types with deep seal trap and chrome plated strainer.
      b. Approved Products:
         1) Josam: 30000Z-5A with 88250 trap.
         2) J. R. Smith: 2010-A with 7222 trap.
         3) Mifab: F1100C
         4) Wade: 1100 with 2450-T trap.
         5) Watts Drainage: FD-100-A5-3.
         6) Zurn: 415 with Z 1000 trap.

F. Cleanouts:
   1. Furnish wall cleanouts with chrome wall cover and screw.
   2. Finished Wall:
      a. Approved Products:
         1) Josam: 58790.
         2) J. R. Smith: 4530.
         3) Mifab: C2462R-1.
         4) Wade: W8460R.
         5) Watts Drainage: CO-460-RD.
         6) Zurn: Z-1446.

2.3 MANUFACTURERS

A. Contact Information:
1. American Standard Plumbing, Piscataway, NJ (800) 442-1902 or (732) 980-3000 www.americanstandard.com.
2. Ancon by Watts Industries, Burlington, ON, Canada (905) 322-4090. www.wattscda.com
3. Bemis Manufacturing Co, Sheboygan Falls, WI (800) 558-7651 or (920) 467-4621. www.bemismfg.com
4. Beneke by Sanderson Plumbing Products, Columbus, MS (800) 647-1042 or (601) 328-4000. www.sppi.com
5. Brass Craft Manufacturing Co, Novi, MI (248) 305-6000 www.brasscraft.com.
6. Brocar Products Inc, Cincinnati, OH (800) 827-1207 or (513) 861-6771. www.brocar.com
7. Cambridge Brass, Cambridge, ON (800) 724-3906 or (519) 621-5520. www.masco.com
8. Chicago Faucet Co, Des Plaines, IL (800) 323-5060 or (847) 803-5000. www.chicagofaucets.com
9. Church Seat Co, Sheboygan Falls, WI (800) 233-7328 or (920) 467-4621. www.bemismfg.com
10. Crane Plumbing, Evanston, IL (847) 864-9777 www.craneplumbing.com.
11. Dearborn Brass, Tyler, TX (800) 527-8443. www.dearbornbrass.com
12. Delta Faucet Co, Indianapolis, IN (317) 818-0396 www.deltafaucet.com.
13. Eljer Plumbingware, Dallas, TX (800) 898-4048 or (972) 560-2000 www.eljer.com.
14. Elkay Manufacturing Co, Oak Brook, IL (630) 574-8484. www.elkay.com
15. Fiat Products, Evanston, IL (847) 864-9777 www.craneplumbing.com.
16. GROHE America, Bloomingdale, IL (800) 301-3407 or (630) 582-7711 www.groheamerica.com.
17. Josam Co, Michigan City, IN (219) 872-5531. www.home.earthlink.net/~jchjosam/
18. Jay R. Smith Maufacturing Co, Montgomery, AL (334) 277-8520. www.jrsmith.com
19. Just Manufacturing Co, Franklin Park, IL (847) 678-5150. www.justsinks.com
20. Keeney Manufacturing Co, Newington, CT (800) 243-0526 or (860) 666-3342. www.keeneymfg.com
21. Kohler Co Plumbing Div, Kohler, WI (888) 361-8000 or (920) 457-4441. www.kohlerco,com
22. McGuire Manufacturing Co, Cheshire, CT (203) 699-1801.
23. Mifab Manufacturing Inc, Amherst, NY (800) 465-2736. www.mifab.com
24. Olsonite Corp, Newnan, GA (800) 521-8266 or (770) 253-3930 www.olsonite.net.
25. Plumberex Specialty Products, Palm Springs, CA (800) 475-8629 or (760) 343-7363. www.plumberex.com
26. Powers Process Controls, Skokie, IL (800) 669-4217 or (847) 673-6700 www.powerscontrols.com.
27. Sloan Valve Co, Franklin Park, IL (800) 745-0800 or (847) 671-4300. www.sloanvalve.com
28. South Fork Manufacturing, Coalville, UT (801) 953-3001
29. Speakman Co, Wilmington, DE (302) 764-9100. www.speakman.com
30. Stern-Williams Inc, Shawnee Mission, KS (913) 362-5635.
31. Taiko USA, Los Angeles, CA (800) 874-7822 or (213) 232-6688. www.taikousa.com
32. T & S Brass & Bronze Works Inc, Travelers Rest, SC (800) 476-4103 or (864) 834-4102. www.tsbrass.com
33. TrueBro Inc, Ellington, CT (800) 340-5969 or (860) 875-2868. www.truebro.com
34. Wade Div Tyler Pipe, Tyler, TX (800) 527-8478 or (903) 882-5511. www.wadedrains.com
35. Watts Drainage: , North Carolina (828) 288-2179 www.wattsdrainage.com
36. Woodford Manufacturing Company, Colorado Springs, CO (800) 621-6032 or (719) 574-1101. www.watcomfg.com
37. Zurn Industries, Commercial Brass Op, Sanford, NC (800) 997-3876 or (919) 775-2255 www.zurn.com.
38. Zurn Industries, Plumbing Products, Erie, PA (814) 871-1261. www.zurn.com
39. Zurn Traps & Supplies, North Grosvenordale, CT (800) 243-1830 or (860) 923-9533. www.zurn.com

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fixtures including traps and accessories with accessible stop or control valve in each hot and cold water branch supply line.

B. Mounting:
   1. Self-Supporting Lavatories: Install using carriers.

C. Make fixture floor connections with approved brand of cast iron floor flange, soldered or calked securely to waste pipe. Make joints between fixtures and floor flanges tight with approved fixture setting compound or gaskets. Calk between fixtures and wall and floor with. Point edges.

3.2 CLEANING

A. Polish chrome finish at completion of Project.

END OF SECTION

SECTION 15416

DRINKING WATER COOLING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install drinking water cooling system units as described in Contract Documents.

B. Related Sections:
   1. Section 15051: General Mechanical Requirements.
   2. Section 15141: Potable Water Piping System.

PART 2 - PRODUCTS

2.1 GENERAL

A. Interior exposed pipe, valves, and fixture trim shall be chrome plated.

B. Do not use flexible water piping.

2.2 MANUFACTURED UNITS

A. Handicap Accessible Fountain:
   1. Include accessory fountain. Vandal proof operating bar on front and both sides. 7.8 GPH minimum of 50 deg F water with 90 deg F room temperature, 1/5 horsepower motor, 120 V, 60 Hz, single phase. Flexi-guard or chrome plated brass bubbler.
   2. Approved Products:
      a. Elkay: Model EZS8L.
      b. Halsey Taylor: HAC8EE-Q-ADA.
      c. Haws: HWUACO8.
      d. Oasis: Model P8AC.
      e. Sunroc: ADAD8.

2.3 MANUFACTURERS

A. Contact Information:
   1. Elkay Manufacturing Co, Oak Brook, IL (630) 574-8484 www.elkay.com.
   2. Halsey Taylor, Oak Brook, IL (630) 574-3500. www.halseytaylor.com
   3. Haws Corp, Sparks, NV (888) 640-4297 or (510) 528-2812. www.hawsco.com
   4. Oasis Corp, Columbus, OH (800) 950-3226 or (614) 861-1350. www.oasiswatercoolers.com
   5. Sunroc Corp, Dover, DE (800) 478-6762 or (302) 678-7800. www.sunroc.com

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fixtures with accessible stop or control valve.

B. Mounting:
   1. Coordinate location of fountain with location and height of electrical outlet to ensure concealment of outlet by fountain.
   2. Anchor bottom of fountain to wall.
   3. Install 3/8 inch IPS union connection and Chicago No. 376 stop to building supply line.
   4. Install 1-1/4 inch IPS slip cast brass 'P' trap. Install trap so it is concealed.
   5. Top surfaces to be 40 and 32 inches above floor unless required otherwise by local code.

3.2 CLEANING

A. Polish chrome finish at completion of Project.

END OF SECTION

SECTION 15484

ELECTRIC WATER HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install electric water heater as specified in Contract Documents.

B. Related Sections:
   1. Section 15101: General Piping Requirements.
   2. Section 15141: Potable Water Piping.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. 4 Gallon:
   1. UL listed.
   2. 110-120 V, single phase, 1500 watts maximum heating capacity.
   3. Thermostatic control with adjustable setting.
   4. Approved Product:
      a. Bradford White: Model M-I-12UT5SS.
      b. Equal as approved by Architect before bidding.

2.2 ACCESSORIES

A. Anchoring Components:
   1. One inch by 18 ga galvanized steel straps.
   2. No. 10 by 2-1/2 inch screws.

B. Thermal Expansion Absorbers:
   1. Bladder type for use with potable water systems.
   2. Acceptable Products:
      a. Therm-X-Trol ST-12 by Amtrol.
      b. Equal as approved by Architect before bidding.

2.3 MANUFACTURERS

A. Contact Information:
   1. Amtrol Inc, West Warwick, RI (401) 884-6300. www.amtrol.com
   2. Bradford-White Corp, Ambler, PA (800) 538-2020. www.bradfordwhite.com

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install temperature-pressure relief valve on hot water heater and pipe discharge to directly above funnel of floor drain.

END OF SECTION

SECTION 15532

GAS-FIRED FURNACES

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install vertical gas-fired condensing furnaces as described in Contract Documents.

B. Related Sections:
   1. Section 15051: General Mechanical Requirements.
   2. Section 15184: Refrigerant Piping System.
   3. Section 15196: Natural Gas Piping System.
   4. Section 15861: Air Filters.

1.2 SYSTEM DESCRIPTION

A. Performance Requirements: Rated at 90 percent minimum AFUE (Annual Fuel Utilization Efficiency) calculated in accordance with DOE test procedures.

1.3 SUBMITTALS

A. Quality Assurance / Control: Equipment check-out sheets.

1.4 WARRANTY

A. Provide 15-year minimum limited warranty on heat exchanger.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Furnaces:
   1. Factory assembled units certified by AGA complete with blower section, steel casing, piped, and wired.
   2. Blower section shall consist of cabinet, blower, and motor.
      a. Cabinet shall be of 22 ga minimum cold rolled steel and have finish coat of baked-on enamel.
      b. Blower shall be Class 1, full DIDW, statically and dynamically balanced.
   3. Automatic controls shall consist of:
      a. 100 percent cut-off safety pilot.
      b. Manual gas shut-off valve.
      c. Operating automatic gas valve.
      d. Solid-state type fan and thermal limit controls.
      e. 24-volt transformer.
      f. Electronic ignition system.
   4. Blower shall be driven by motor with adjustable pitch V-belt drive or by multi-speed direct driven motor.
   5. Furnace section shall be enclosed in 22 ga minimum enameled steel casing lined with foil covered insulation.

6. Heat Exchanger: Aluminized steel.
7. Gas Burners: Aluminized steel.
8. PVC intake of outside air and PVC combustion product exhaust, with sealed combustion, direct vent system.
9. Concentric roof termination kit for roof mounting.
10. Approved Products:
    a. Standard Furnaces:
        1) Carrier 58 MXB / Bryant 350 AAV.
        2) Lennox G51MP.
        3) Trane TUXC.
        4) York GY9S.

B. Cooling Coil:
1. Cooling coil shall consist of heavy gauge steel cabinet with baked-on enamel finish to match furnace.
    a. Coil shall have aluminum fins bonded to seamless copper tubing.
    b. Coil shall be ARI rated. Provide drain pans with connections at one end.
    c. Use thermal expansion valve with brazed joints in place of capillary tube metering device. Compression fittings not acceptable.
    d. Do not include cooling coil and coil cabinet on furnaces serving zones where cooling is not required.
2. Approved Products:
    a. Vertical:
        1) Carrier / Bryant CK3B.
        2) Lennox CH23 or CH33.
        3) Trane TXC.
        4) York G1HA, G2FD.

2.2 ACCESSORIES

A. Build filter frame external to furnace as detailed on Drawings.

B. Vibration Isolators:
1. Horizontal Installation:
    a. Neoprene hanger type with load of 75 lbs maximum.
    b. Approved Products:
        1) RH by Kinetics Noise Control.
        2) HD by Mason Industries
        3) RH by Vibration Mounting & Controls

2.3 MANUFACTURERS

A. Contact Information:
1. Carrier Corp, Syracuse, NY (800) 227-7437.
2. Kinetics Noise Control, Dublin, OH (800) 959-0191 or (514) 889-0480 www.kineticsnoise.com
3. Lennox Industries, Dallas, TX (972) 497-5000.
4. Mason Industries, Hauppage, NY (516) 348-0282 www.mason-ind.com
5. Trane, La Crosse, WI (800) 288-7263.
6. Vibration Mounting & Controls, Bloomingdale, NJ (800) 569-8423 or (973) 838-1780 www.vmc-kdc.com
7. York International, York, PA (800) 368-0465

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install vibration isolator on each hanger rod supporting horizontal furnace and under each corner of vertical furnace.

3.2 FIELD QUALITY CONTROL

A. Manufacturer's Field Service:
   1. Furnace distributor's technical service representative shall:
      a. Verify proper gas orifice size.
      b. Clock gas meter for rated input.
      c. Verify and set gas pressure at furnace.
      d. Check and measure temperature rise.
      e. Check safety controls for proper operation.
      f. Check combustion vent sizes and combustion air sizes.
   2. In addition, furnace distributor's technical service representative shall start up, check out, and adjust furnaces using equipment check-out sheet provided by Manufacturer. Complete and sign all items on sheet.

END OF SECTION

SECTION 15557

AIR PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install heating equipment exhaust piping and combustion air intake piping as described in Contract Documents.

B. Related Sections:
   1. Section 15101: General Piping Requirements.

1.2 REFERENCES

A. American Society For Testing And Materials:
   1. ASTM D 1785-99, 'Standard Specification for Poly(Vinyl Chloride)(PVC) Plastic Pipe, Schedules 40, 80, and 120.'
   2. ASTM D 2564-96a, 'Standard Specification for Solvent Cements for Poly(Vinyl Chloride)(PVC) Plastic Piping Systems.'
   3. ASTM D 2661-97a, 'Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Drain, Waste, and Vent Pipe and Fittings.'
   4. ASTM D 2665-00, 'Standard Specification for Poly(Vinyl Chloride)(PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.'

PART 2 - PRODUCTS

2.1 MATERIALS

A. Air Piping: Schedule 40 pipe and fittings meeting requirements of ASTM D 1785, ASTM D 2661, or ASTM D 2665.

B. Piping Primer And Cement: Meet requirements of ASTM D 2564.

2.2 MANUFACTURERS

A. Contact Information:
   1. Armaflex by Armacell, Mebane, NC (800) 232-3341. www.armaflex.com
   2. BFG Industries, West Columbia, SC (800) 845-2220 or (803) 796-1380.
   3. IMCOA, Haltom City, TX (800) 535-5078 or (817) 485-5290. www.imcoa.com
   4. Rubatex, Roanoke, VA (800) 782-2839 or (540) 561-6000. www.rbxcorp.com

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation For Condensing Furnaces:
   1. Run individual vent and individual combustion intake piping from each furnace to concentric roof termination kit provided by Furnace Manufacturer. Slope lines downward toward furnace.

2. Slope combustion chamber drain downward to funnel drain. Anchor to wall with wall clamps, allowing free movement through clamp for expansion.
3. Use concentric roof termination kit provided by Furnace Manufacturer. Install vent and combustion air intake piping at clearance and distances required by Furnace Manufacturer.
4. Attach factory-supplied neoprene coupling to combustion-air inlet connection and secure with clamp.
5. Ensure that factory-supplied perforated metal disc is installed in flexible coupling, unless its removal is required.

B. Support:
1. Support concentric roof termination kit at ceiling or roof line with 20 ga sheet metal straps as detailed on Drawings.
2. Support horizontal sections of pipe in accordance with requirements of Section 15101. Anchor securely to structure, not allowing pipe to sway.

END OF SECTION

SECTION 15671

AIR-COOLED REFRIGERANT CONDENSING UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install condensing units as described in Contract Documents.

B. Related Sections:
   1. Section 15051: General Mechanical Requirements.

1.2 SYSTEM DESCRIPTION

A. Performance Requirements: SEER rating as defined by ARI shall be not less than 13..0

1.3 SUBMITTALS

A. Quality Assurance / Control:
   1. Equipment check-out sheets.
   2. Technician certificate for use of CFC and HCFC refrigerants.

1.4 QUALITY ASSURANCE

A. Qualifications: Refrigerant piping shall be installed by refrigeration contractor licensed by State and by technicians certified in use of CFC and HCFC refrigerants.

B. Requirements of Regulatory Agencies: Each unit shall be UL / ULC labeled.

1.5 WARRANTY

A. Five-year warranty on compressors from date of 'start-up.' Record 'start-up' date on warranty certificate for each unit.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Condensing Units, 2 Through 5 Tons:
   1. General:
      a. Units shall be operable down to 0 deg F outdoor temperature when outside winter design temperature is below 35 deg F.
      b. Condensing units shall use R-410a refrigerant.
      c. Only one liquid line, one suction line, and one power connection shall be made to each compressor. Provide charging valves.
   2. Condenser Coils:
      a. Aluminum plate fins mechanically bonded to seamless copper tubes or 'Spine Fin' trade mark system which has aluminum fins epoxy bonded to aluminum tubes.
      b. Provide coil guard for unit.

3. Fans:
    a. Direct driven propeller upflow type.
    b. Fan motor shall be single or two speed, thermostatically controlled, permanently lubricated, and designed with permanent protection.
    c. Motors shall be resiliently mounted.
    d. Each fan shall have a safety guard.
4. Compressor:
    a. Each condenser unit shall have only one compressor.
    b. Hermetic design with following features:
        1) Externally mounted brass service valves with charging connections.
        2) Crankcase heater.
        3) Resilient rubber mounts.
        4) Compressor motor-overload protection.
        5) Single speed.
5. Controls:
    a. Factory wired and located in separate enclosure.
    b. Factory installed safety devices:
        1) High and low pressure cutout.
        2) Condenser fan motor-overload devices.
    c. Factory-installed anti-cycle timers to prevent units from starting up again for five minutes after any power interruption.
    d. Low ambient kit.
6. Casing:
    a. Fully weatherproof for outdoor installation. Finish shall be weather resistant.
    b. Openings shall be provided for power and refrigerant connections.
    c. Panels shall be removable for servicing.
7. Approved Products:
    a. Furnace Systems:
        1) Carrier 24ACA3 / Bryant 123ANA.
        2) Lennox 13ACX
        3) Trane 4TTR
        4) York CZB.

2.2 MANUFACTURERS

A. Contact Information:
    1. Carrier Corp, Syracuse, NY (800) 227-7437 or Carrier Canada Ltd/Ltee, Meadowvale, ON (905) 826-9508.
    2. Lennox, Dallas, TX (972) 497-5000 or Lennox Industries (Canada) Ltd, Etobucoke, ON (416) 621-9302.
    3. Trane, La Crosse, MI
    4. York International Corp, York, PA (800) 861-1001 or (717) 771-7890. www.york.com

2.3 ACCESSORIES

A. Vibration Isolators: 4 inches square by 3/4 inch thick minimum neoprene type vibration isolation pads.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set condensing units level on concrete slab on vibration isolation pads located at each corner of unit.

B. Do not use capillary tube and piston type refrigerant metering devices.

3.2 FIELD QUALITY CONTROL

A. Manufacturer's Field Service:
   1. Condensing units shall be started up, checked out, and adjusted by Condensing Unit Manufacturer's authorized factory trained service mechanic.
   2. Use equipment checkout sheet provided by Manufacturer. Complete and sign all items on sheet.

END OF SECTION

SECTION 15801

GENERAL DUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. General procedures and requirements for ductwork.
   2. Repair leaks in ductwork, as identified by smoke test, at no additional cost to Owner.

B. Products Installed But Not Supplied Under This Section:
   1. Seismic Restraints.

C. Related Sections:
   1. Section 13352: Air test and balance and smoke testing of ductwork.
   2. Section 15051: General Mechanical Requirements.

1.2 SUBMITTALS

A. Samples: Sealer and gauze proposed for sealing ductwork.

B. Quality Assurance / Control:
   1. Manufacturer=s installation manuals providing detailed instructions on assembly, joint sealing, and system pressure testing for leaks.
   2. Specification data on sealer and gauze proposed for sealing ductwork.

1.3 QUALITY ASSURANCE

A. Requirements: Construction details not specifically called out in Contract Documents shall conform to applicable requirements of SMACNA HVAC Duct Construction Standards.

B. Pre-Installation Conference: Schedule conference immediately before installation of ductwork.

PART 2 - PRODUCTS

A. Finishes, Where Applicable: Colors as selected by Architect.

B. Duct Hangers:
   1. One inch by 20 ga galvanized steel straps or steel rods as shown on Drawings, and spaced not more than 96 inches apart. Do not use wire hangers.
   2. Attaching screws at trusses shall be 2 inch No. 10 round head wood screws. Nails not allowed.

PART 3 - EXECUTION

3.1 INSTALLATION

A. During installation, protect open ends of ducts by covering with plastic sheet tied in place to prevent entrance of debris and dirt.

B. Make necessary allowances and provisions in installation of sheet metal ducts for structural conditions of building. Revisions in layout and configuration may be allowed, with prior written approval of Architect. Maintain required airflows in suggesting revisions.

C. Hangers And Supports:
   1. Install pair of hangers close to each transverse joint and elsewhere as required by spacing indicated in table on Drawings.
   2. Install upper ends of hanger securely to floor or roof construction above by method shown on Drawings.
   3. Attach strap hangers to ducts with cadmium-plated screws. Use of pop rivets or other means will not be accepted.
   4. Where hangers are secured to forms before concrete slabs are poured, cut off flush all nails, strap ends, and other projections after forms are removed.
   5. Secure vertical ducts passing through floors by extending bracing angles to rest firmly on floors without loose blocking or shimming. Support vertical ducts, which do not pass through floors, by using bands bolted to walls, columns, etc. Size, spacing, and method of attachment to vertical ducts shall be same as specified for hanger bands on horizontal ducts.

3.2 CLEANING

A. Clean interior of duct systems before final completion.

END OF SECTION

SECTION 15812

LOW-PRESSURE STEEL DUCTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install above-grade low-pressure steel ducts and related items as described in Contract Documents.

B. Related Sections:
   1. Section 13352: Smoke testing.
   2. Section 15081: Thermal Insulation for ducts, plenum chambers, and casings.
   3. Section 15801: General Duct Requirements.
   4. Section 15915: Temperature control damper actuators and actuator linkages.

1.2 REFERENCES

A. American Society For Testing And Materials:
   1. ASTM A 653-00, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.'

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Sheet Metal:
   1. Fabricate ducts, plenum chambers and casings of zinc-coated, lock-forming quality steel sheets meeting requirements of ASTM A 653, with G 60 coating.

B. Ducts:
   1. Round Duct:
      a. Spiral Seam: 28 ga minimum for ducts up to and including 14 inches in diameter.
      b. Longitudinal Seam:
         1) 28 ga minimum for ducts up to and including 8 inches in diameter.
         2) 26 ga minimum for ducts over 8 inches and up to 14 inches in diameter.

C. Duct Sealer For Interior Ducts:
   1. Approved Products:
      a. Duct Butter or Butter Tak by Cain Manufacturing Co Inc, Pelham, AL (800) 554-0342 or (205) 663-2200. www.cainmfg.com
      b. DP 1010 by Design Polymerics, Fountain Valley, CA (800) 641-0808 or (714) 432-0600. www.designpoly.com
      c. S2 by Duro Dyne, Farmingdale, NY (800) 899-3876 or (516) 249-9000 www.durodyne.com.
      d. Versa Grip 102 by Hardcast Inc, Wylie, TX (800) 527-7092 or (972) 442-6545. www.hardcast.com
      e. 15-325 by Kingco, King Adhesive Corp, St Louis, MO (800) 233-8171 or (314) 772-9953.
      f. 44-41 by Mon-Eco Industries Inc, East Brunswick, NJ (800) 899-6326 or (908) 257-7942.
      g. Airseal #11 by Polymer Adhesive Sealant Systems Inc, Irving, TX (888) 721-7325.
      h. Multipurpose Duct Sealant by Trans-Continental Equipment Co.
      i. Water Base Duct Sealer by United McGill Corp, Columbus, OH (800) 624-5535 or (614) 836-9981. www.unitedmcgillcorp.com

D. Duct Sealer For Exterior Ducts:
   1. Approved Products:
      a. Hardcast Tape and RTA-50 adhesive by Hardcast Inc, Wylie, TX (800) 527-7092 or (972) 442-6545. www.hardcast.com

2.2 FABRICATION

A. Ducts:
   1. Straight and smooth on inside with joints neatly finished.
   2. Ducts shall be large enough to accommodate inside acoustic duct liner. Dimensions shown on Drawings are net clear inside dimensions after duct liner has been installed.
   3. Duct panels having acoustic duct liner need not be cross-broken or beaded.
      a. Apply cross-breaking to sheet metal between standing seams or reinforcing angles.
      b. Center of cross-break shall be of required height to assure surfaces being rigid.
   4. Duct drops to diffusers shall be round, square, or rectangular to accommodate diffuser neck. Drops shall be same gauge as branch duct.
      a. Seal joints air tight.
      b. Externally insulate round drops.
      c. Internally line square and rectangular drops.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Interface With Other Work: Reseal transverse joint duct leaks and seal longitudinal duct joint leaks discovered during air test and balance procedures specified in Section 13352, at no additional cost to Owner.

B. Install internal ends of slip joints in direction of flow. Seal transverse and longitudinal joints air tight using specified duct sealer.

C. Securely anchor ducts and plenums to building structure with specified duct hangers attached with screws. Do not hang more than one duct from a duct hanger. Brace and install ducts so they shall be free of vibration under all conditions of operation.

D. Ducts shall not bear on top of structural members.

E. Paint ductwork visible through registers, grilles, and diffusers flat black.

F. Under no conditions will pipes, rods, or wires be allowed to penetrate ducts.

END OF SECTION

SECTION 15815

NON-METAL DUCTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install supply air branch duct runouts to diffusers as described in Contract Documents.

B. Related Sections:
   1. Section 15801: General Duct Requirements.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Ducts:
   1. Formable, flexible, circular duct which shall retain its cross-section, shape, rigidity, and shall not restrict airflow after bending.
   2. Insulation: Nominal 1-1/2 inches, 3/4 lb/cu ft density fiberglass insulation with air-tight, polyethylene or polyester core, sheathed in seamless vapor barrier jacket factory installed over flexible assembly.
   3. Assembly, including insulation and vapor barrier, shall meet Class I requirement of NFPA 90A-1989 and be UL 181 rated, with flame spread of 25 or less and smoke developed rating of 50 or under.
   4. Approved Products:
      a. ANCO-FLEX 4625 by Anco Products Inc, Elkhart, IN (800) 837-2626 or (574) 213-5574. www.ancoproductsinc.com
      b. PF/UPC #090 by Flex-Aire.
      c. RJ-30 by Flexible Air Movers Inc.
      d. M-KC by Thermaflex by Flexible Technologies, Abbeville, SC (864) 459-5441. www.wereflexible.com
      e. Type 4m Insulated by Flexmaster USA Inc, Houston, TX (713) 462-7694 www.flexmasterusa.com or Flexmaster Canada, Ltd, Richmond Hill, ON (905) 731-9411.

B. Cinch Bands: Nylon, 3/8 inch removable and reusable type.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct in fully extended condition free of sags and kinks, using 72 inch maximum lengths.

B. Make duct connections by coating exterior of duct collar for 3 inches with duct sealer and securing duct in place over sheet metal collar with specified cinch bands.

END OF SECTION

SECTION 15820

DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install duct accessories in specified ductwork as described in Contract Documents.

B. Related Sections:
   1. Section 15801: General Duct Requirements.
   2. Section 15915: Temperature control damper actuators and actuator linkages.

1.2 REFERENCES

A. American Society for Testing and Materials:
   1. ASTM A 653-00, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.'
   2. ASTM C 665-98, 'Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.'
   3. ASTM C 1071-00, 'Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Acoustical Material).'

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Acoustical Liner System:
   1. Duct Liner:
      a. One inch thick, 1-1/2 lb density fiberglass conforming to requirements of ASTM C 1071. Liner will not support microbial growth when tested in accordance with ASTM C 665.
      b. Approved Products:
         1) Ultralite or ToughGard by CertainTeed.
         2) Duct Liner E-M by Knauf Fiber Glass.
         3) Akousti-Liner by Manson Insulation.
         4) Aeroflex Plus by Owens Corning.
         5) Linacoustic by Johns-Manville.
   2. Adhesive:
      a. Approved Water-Based Products:
         1) Cain: Hydrotak.
         2) Design Polymerics: DP2501 or DP2502 (CMCL-2501).
         3) Duro Dyne: WSA.
         4) Hardcast: IA-901, 925, 921.
         5) Kingco: 10-568.
         6) Miracle: PF-101.
         7) Mon-Eco: 22-67 or 22-76.
         8) Polymer Adhesive: Glasstack #35.
         9) Techno Adhesive: 133.
         10) United McGill: Uni-tack.
      b. Approved Solvent-Based (non-flammable) Products:
         1) Cain: Safetak.
         2) Duro Dyne: FPG.

3) Hardcast: Glas-Grip 648-NFSE, 658.
4) Kingco: 15-137.
5) Miracle: PF-91.
6) Mon-Eco: 22-24.
7) Polymer Adhesive: Q-Tack.
8) Techno Adhesive: 'Non-Flam' 106.

c. Approved Solvent-Based (flammable) Products:
1) Cain: HV200.
2) Duro Dyne: MPG.
3) Hardcast: Glas-Grip 636-SE.
4) Kingco: 15-146.
5) Miracle: PF-96.
6) Mon-Eco: 22-22.
7) Polymer Adhesive: R-Tack.
8) Techno Adhesive: 'Flammable' 106.

3. Fasteners:
a. Adhesively secured fasteners not allowed.
b. Approved Products:
1) AGM Industries Inc: 'DynaPoint' Series RP-9 pin.
2) Cain.
3) Duro Dyne.
4) Dyn Air: DWT or FWT
5) Omark dished head 'Insul-Pins.'
6) Gripnails may be used if each nail is installed by 'Grip Nail Air Hammer' or by 'Automatic Fastener Equipment' in accordance with Manufacturer's recommendations.

B. Flexible Equipment Connections:
1. 30 oz closely woven UL approved glass fabric, double coated with neoprene.
2. Fire retardant, waterproof, air-tight, resistant to acids and grease, and withstand constant temperatures of 250 deg F.
3. Approved Products:
a. Cain: N-100.
b. Duro Dyne: MFN.
c. Dyn Air: CPN with G-90 galvanized off-set seam
d. Elgen: ZLN.
e. Ventfabrics: Ventglas.
f. Ductmate: ProFlex.

C. Duct Access Doors:
1. Factory built insulated access door with hinges and sash locks. Construction shall be galvanized sheet metal, 24 ga minimum.
2. Approved Products:
a. Air Balance: Fire**/**Seal FSA 100.
b. Air-Rite: Model HAD-2.
c. Cesco: HDD.
d. Flexmaster: Spin Door.
e. Kees Inc: ADH-D.
f. Nailor: 085H-01.
g. Pottorff: 60-HAD.
h. Ruskin: ADH-24.

D. Dampers And Damper Accessories:
1. Locking Quadrant Damper Regulators:
a. Approved Products:
1) Duro Dyne: KS-38.
2) Dyn Air: QPS-385
3) Ventfabrics: Ventline 555.
4) Young: No. 1.
2. Concealed Ceiling Damper Regulators:

a. Approved Products:
    1) Cain.
    2) Duro Dyne.
    3) Metco Inc.
    4) Ventfabrics: 666 Ventlok.
    5) Young: 301.

3. Volume Dampers:
    a. Factory-manufactured 16 ga galvanized steel, single blade and opposed blade type with 3/8 inch axles and end bearings. Blade width 8 inches maximum. Blades shall have 1/8 inch clearance all around.
        1) Damper shall operate within acoustical duct liner.
        2) Provide channel spacer equal to thickness of duct liner.
    b. Dampers above removable ceiling and in Mechanical Rooms shall have locking quadrant on bottom or side of duct. Otherwise, furnish with concealed ceiling damper regulator and cover plate.
    c. Approved Products:
        1) Air-Rite: Model CD-2.
        2) American Warming: VC-2-AA.
        3) Arrow: OBDAF-207.
        4) C & S: AC40.
        5) Cesco: AGO.
        6) Daniel: CD-OB.
        7) Greenheck: VCD-20.
        8) Pottorff: CD-42.
        9) Ruskin: MD-35.
        10) UTEMP: CD-OB.

4. Motorized Outside Air Dampers:
    a. Low leakage type. AMCA certified.
    b. Damper Blades:
        1) Steel or aluminum airfoil type with mechanically locked blade seals, 8 inch blade width maximum measured perpendicular to axis of damper.
        2) Jamb seals shall be flexible metal compression type.
        3) Opposed or single blade type.
    c. Make provision for damper actuators and actuator linkages to be mounted external of air flow.
    d. Approved Products:
        1) Air Balance: AC 526.
        2) American Warming: AC526.
        3) Arrow: AFD-20.
        4) C & S: AC50.
        5) Cesco: AGO3.
        6) Honeywell: D-643.
        7) Pottorff: CD-52.
        8) Ruskin: CD-60.

5. Backdraft Dampers:
    a. Backdraft blades shall be nonmetallic neoprene coated fiberglass type.
    b. Stop shall be galvanized steel screen or expanded metal, 1/2 inch mesh.
    c. Frame shall be galvanized steel or extruded aluminum alloy.
    d. Approved Products:
        1) Air-Rite: Model BDD-3.
        2) American Warming: BD-15.
        3) C & S: BD30.
        4) Cesco: FBD 101.
        5) Daniel: FBD-H/V.
        6) Pottorff: 50FBD.
        7) Ruskin: NMS2.
        8) UTEMP: BFEA.

E. Air Turns:
    1. Single thickness vanes. Double thickness vanes not acceptable.

2. 4-1/2 inch wide vane rail. Junior vane rail not acceptable.

F. Branch Tap for Flexible Ductwork:
1. Factory-manufactured rectangular-to-round 45 degree leading tap fabricated of 24 ga zinc-coated lock-forming quality steel sheets meeting requirements of ASTM A 653, with G-90 coating.
2. One inch wide mounting flange with die formed corner clips, pre-punched mounting holes, and adhesive coated gasket.
3. Manual Volume Damper:
   a. Single blade, 22 ga minimum
   b. 3/8 inch minimum square rod with brass damper bearings at each end.
   c. Heavy-duty locking quadrant on 1-1/2 inch high stand-off mounting bracket attached to side of round duct.
4. Approved Products:
   a. ST-1HD by Air-Rite.
   b. STO by Flexmaster.
   c. HET by Sheet Metal Connectors.

2.2 MANUFACTURERS

A. Contact Information:
1. AGM Industries, Brockton, MA (800) 225-9990.
2. Air Balance Inc, Holland, OH (419) 865-5000. www.air-balance.com
3. Air Filter Inc, Baltimore, Md (800) 875-3442. www.afinc.com
4. Air-Rite Manufacturing, Bountiful, UT (801) 295-2529.
5. American Warming & Ventilating, Holland, OH (419) 865-5000 www.american-warming.com.
6. Arrow United Industries, Wyalusing, PA (717) 746-1888 www.arrowunited.com.
7. Cain Manufacturing Company Inc, Pelham, AL (800) 554-0342 or (205) 663-2200. www.cainmfg.com
8. C & S Air Products, Montebello, CA (323) 889-6769.
9. CertainTeed Corp, Valley Forge, PA (800) 233-8990 or (610) 341-7739 www.certainteed.com.
10. Cesco Products, Minneapolis, MN (888) 422-3726. www.cescoproducts.com
11. Design Polymerics, Fountain Valley, CA (800) 641-0808 or (714) 432-0600. www.designpoly.com
12. Ductmate Industries Inc, East Monongahela, PA (800) 245-3188 or (412) 258-0500 www.ductmate.com
13. Duro Dyne, Farmingdale, NY (800) 899-3876 or (516) 249-9000 www.durodyne.com.
14. Dwyer Instruments Inc, Michigan City, IN (800) 872-9141 or (219) 879-8000. www.dwyer-inst.com
15. Dyn Air, Div Carlisle, LaChine, QB (800) 544-5535 www.dynair.ca
16. Flexmaster USA Inc, Houston, TX (713) 462-7694 www.flexmasterusa.com.
17. Greenheck Corp, Schofield, WI (715) 359-6171 www.greenheck.com.
18. Gripnail Corp, East Providence, RI (800) 474-7624 or (401) 431-1791. www.gripnail.com
19. Hardcast Inc, Div Carlisle, Wylie, TX (800) 527-7092 or (972) 442-6545. www.hardcast.com
20. Honeywell Inc, Minneapolis, MN (800) 328-5111 or (612) 952-2000 www.honeywell.com.
21. Industrial Acoustics Co, Bronx, NY (718) 931-8000. www.industrialacoustics.com
22. Johns-Manville, Denver, CO (800) 654-3103 or (303) 978-2000. www.jm.com
23. Kees Inc, Elkhart Lake, WI (920) 876-3391. www.kees.com
24. Kingco - King Adhesive Corp, St Louis, MO (800) 233-8171 or (314) 772-9953.
25. Knauf Fiber Glass, Shelbyville, IN (800) 825-4434 or (317) 398-4434 www.knauffiberglass.com.
26. Manson Insulation Inc, Brossard, BC Canada (800) 626-7661 or (450) 659-9101.
27. Metco Inc, Salt Lake City, UT (801) 467-1572.
28. Miracle Sealants + Abrasives Co, Irwindale, CA (800) 350-1901 or (626) 814-8988. www.miraclesealants.com
29. Mon-Eco Industries Inc, East Brunswick, NJ (800) 899-6326 or (908) 257-7942.
30. Nailor Industries Inc, Houston, TX (281) 590-1172. www.nailor.com
31. Omark Industries.
32. Owens Corning, Toledo OH (800) 438-7465 or (419) 248-8000 www.owenscorning.com.
33. Polymer Adhesive Sealant Systems Inc, Irving, TX (888) 721-7325.

34. Pottorff Company Inc, Montebello, CA (213) 728-0004.
35. Ruskin Manufacturing, Kansas City, MO (816) 761-7476 www.ruskin.com.
36. Sheet Metal Connectors Inc, Minneapolis, MN (612) 572-1100. www.smconnectors.com
37. Techno Adhesive.
38. Titus, Richardson, TX (972) 699-1030 www.titus-hvac.com.
39. United McGill Corp, Columbus, OH (800) 624-5535 or (614) 836-9981. www.unitedmcgillcorp.com
40. Utemp Inc, Salt Lake City, UT (801) 978-9265.
41. Ventfabrics Inc, Chicago, IL (800) 621-1207 or (773) 775-4477. www.ventfabrics.com
42. Young Regulator Co, Cleveland, OH (216) 663-5646. www.youngregulator.com

2.3 FABRICATION

A. Duct Liner:
   1. Install mat finish surface on air stream side. Secure insulation to cleaned sheet metal duct with continuous 100 percent coat of adhesive and with 3/4 inch long mechanical fasteners 12 inches on center maximum unless detailed otherwise on Drawings. Pin all duct liner.
   2. Accurately cut liner and thoroughly coat ends with adhesive. Butt joints tightly. Top and bottom sections of insulation shall overlap sides. If liner is all one piece, folded corners shall be tight against metal. Ends shall butt tightly together.
   3. Coat longitudinal and transverse edges of liner with adhesive.

B. Air Turns:
   1. Permanently install vanes arranged to permit air to make abrupt turn without appreciable turbulence, in 90 degree elbows of above ground supply and return ductwork.
   2. Quiet and free from vibration when system is in operation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Duct Liner:
   1. Furnish and install acoustic lining in following types of ducts:
      a. Supply air.
      b. Return air.
      c. Mixed air.
      d. Transfer air.
      e. Relief air.
      f. Exhaust air.
      g. Elbows, fittings, and diffuser drops greater than 12 inches in length.
      h. Concrete underfloor boxes.

B. Flexible Connections: Install flexible inlet and outlet duct connections to each furnace.

C. Access Doors In Ducts:
   1. Install at each manual outside air damper and at each motorized damper. Locate doors within 6 inches of installed dampers.
   2. Install within 6 inches of fire dampers and in Mechanical Room if possible. Install on side of duct that allows easiest access to damper.

D. Dampers And Damper Accessories:
   1. Install concealed ceiling damper regulators.
      a. Paint cover plates to match ceiling tile.
      b. Do not install damper regulators for dampers located directly above removable ceilings or in Mechanical Rooms.
   2. Provide each take-off with an adjustable volume damper to balance that branch.

a. Anchor dampers securely to duct.
b. Install dampers in main ducts within insulation.
c. Dampers in branch ducts shall fit against sheet metal walls, bottom and top of duct, and be securely fastened. Cut duct liner to allow damper to fit against sheet metal.
d. Where concealed ceiling damper regulators are installed, provide cover plate.

3. Install motorized dampers.

END OF SECTION

SECTION 15836

EXHAUST FANS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install exhaust fans as described in Contract Documents.

B. Related Sections:
   1. Section 15801: General Duct Requirements.
   2. Division 16: Control device and electrical connection.

1.2 QUALITY ASSURANCES

A. Requirements of Regulatory Agencies: Bear AMCA seal and UL label.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Ceiling Mounted Exhaust Fans:
   1. Acoustically insulated housings. Sound level rating of 4.6 sones maximum for fan RPM and CFM listed on Drawings.
   2. Include chatterproof integral back-draft damper with no metal-to-metal contact.
   3. True centrifugal wheels.
   4. Entire fan, motor, and wheel assembly shall be easily removable without disturbing housing.
   5. Suitably ground motors and mount on rubber-in shear vibration isolators.
   6. Quality Standards: Greenheck SP or Penn Zephyr.
   7. Approved Manufacturers:
      a. Acme.
      b. Breidert.
      c. Broan.
      d. Carnes.
      e. Cook-Gemini.
      f. Greenheck.
      g. Penn.

2.2 MANUFACTURERS

A. Contact Information:
   1. Acme Engineering & Manufacturing Corp, Muskogee, OK (918) 682-7791. www.acmefan.com
   2. Breidert Air Products, Jacksonville, FL (904) 731-4721. www.breidert.com
   3. Broan Manufacturing Co Inc, Hartford, WI (800) 558-1711 or (414) 673-4340 www.broan.com.
   4. Carnes Co, Verona, MI (608) 845-6411. www.carnes.com
   5. Greenheck Corp, Schofield, WI (715) 359-6171. www.greenheck.com
   6. Loren Cook Co, Springfield, MO (417) 869-6474. www.lorencook.com
   7. Penn Ventilation Co, Philadelphia, PA (215) 464-8900 www.pennvent.com.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Anchor fan units securely to structure.

END OF SECTION

SECTION 15851

DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install diffusers, registers, and grilles connected to ductwork as described in Contract Documents.

B. Related Sections:
   1. Section 15801: General Duct Requirements.

1.2 MAINTENANCE

A. Extra Materials: Leave tool for removing core of each different type of grille for building custodian.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Ceiling Return And Transfer Grilles:
   1. Finish: Off-white baked enamel.
   2. 1/2 inch spacing.
   3. Approved Products:
      a. Carnes: RSLA.
      b. J & J: S90H.
      c. Krueger: S85H.
      d. Metal*Aire: SRH.
      e. Nailor: 6155H.
      f. Price: 535.
      g. Titus: 355RL or 355 SL.
      h. Tuttle & Bailey: T70D.

B. Ceiling Diffusers:
   1. Finish: Off-white baked enamel.
   2. Approved Products:
      a. Carnes: SKSA.
      b. J & J: R-1400.
      c. Krueger: SH.
      d. Metal*Aire: 5500S.
      e. Nailor: 65OOB.
      f. Price: SMD-6.
      g. Titus: TDC-6.
      h. Tuttle & Bailey: MS.

2.2 MANUFACTURERS

A. Contact Information:
   1. Carnes Co, Verona, MI (608) 845-6411. www.carnes.com
   2. J & J Register, El Paso, TX (915) 852-9111.

3. Krueger Air System Components, Richardson, TX (972) 918-8269. www.krueger-hvac.com
4. Metal*Aire by Metal Industries Inc, Clearwater, FL (813) 441-2651. www.metalaire.com
5. Nailor Industries Inc, Houston, TX (281) 590-1172 www.nailor.com.
6. Price Industries Inc, Suwanee, GA (800) 835-5081 or (770) 623-6404 www.price-hvac.com.
7. Titus, Richardson, TX (972) 699-1030. www.titus-hvac.com
8. Tuttle & Bailey, Richardson, TX (972) 497-0486. www.tuttleandbailey.com

PART 3 - EXECUTION

3.1 INSTALLATION

A. Anchor securely into openings. Secure frames to ductwork by using four sheet metal screws, one per side.

END OF SECTION

SECTION 15853

ROOF-MOUNTED AIR INLETS AND OUTLETS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install roof vents as described in Contract Documents.

B. Related Sections:
   1. Section 15801: General Duct Requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Roof Vents:
   1. Penthouse type of extruded aluminum complete with roof curb to fit slope of roof and 1/2 inch mesh 16 ga aluminum bird screen.
   2. Finish as specified by Architect.
   3. Approved Products:
      a. Tiered Type: Model TRE extruded aluminum ventilator by Loren Cook.
      b. Louvered Penthouse:
         1) Model RLX by Breidert Air Products.
         2) Model GLAB by Carnes.
         3) Model WRH by Greenheck.
         4) Model MPH by Jenn-Air.

B. Louvered Penthouses:
   1. Fabricated from 12 ga extruded aluminum.
      a. All welded construction.
      b. Screws or rivets will not be allowed.
   2. Blades:
      a. Horizontal at 45 degree angle with return bends at upper edges.
      b. Welded, mitered corners for continuous blade effect.
   3. Bird Screens: 1/2 inch square mesh 16 ga aluminum in extruded aluminum, rewirable frames on interior of louvers.
   4. Penthouse Finish: Clear anodized aluminum.
   5. Curbs:
      a. Extruded aluminum, insulated, factory-fabricated curb.
      b. Insulation: Minimum 1-1/2 inch thick, 3 lb density fiber glass.
      c. Curb Extension: 8 inches above finished roof level.
   6. Provide automatic back draft damper on Relief Air Penthouses. Provide motorized damper where indicated on Drawings.
   7. Approved Products:
      a. Carnes: GLAB.
      b. Cook: Type TRE.
      c. Jenn-Aire: Model MPH.
      d. Vent Products: Model 7100.

2.2 MANUFACTURERS

A. Contact Information:
   1. Breidert Air Products, Jacksonville, FL (904) 731-4721. www.breidert.com
   2. Carnes Company, Verona, WI (608) 845-6411. www.carnes.com
   3. Greenheck Fan Corporation, Schofield, WI (715) 359-6171. www.greenheck.com
   4. Loren Cook Co, Springfield, MO (417) 869-6474. www.lorencook.com
   5. Jenn-Air Industries Inc, Indianapolis, IN (800) 688-1100.
   6. Vent Products Co, Inc, Chicago, IL (800) 368-8368 or (773) 521-1900. www.ventprod.com

PART 3 - EXECUTION: Not Used

END OF SECTION

SECTION 15861

AIR FILTERS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install filters used in mechanical equipment.

B. Related Sections:
   1. Section 15801: General Duct Requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Furnace Filters: One inch thick throw-away type as recommended by Furnace Manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide ample access for filter removal.

3.2 FIELD QUALITY CONTROL

A. Inspection: At date of Substantial Completion, air filters shall be new, clean, and approved by Owner's representative.

END OF SECTION

SECTION 15915

ELECTRIC AND ELECTRONIC CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install automatic temperature control system as described in Contract Documents.
   2. Furnish and install conductors and make connections to control devices, motors, and associated equipment.
   3. Assist in air test and balance procedure.

B. Related Sections:
   1. Section 13352: Air test and balance.
   2. Section 15051: General Mechanical Requirements.
   3. Section 15820: Furnishing and installing of temperature control dampers.
   4. Division 16:
      a. Furnishing and installing of raceway, conduit, and junction boxes, including pull wires, for temperature control system except as noted above.
      b. Power wiring to magnetic starters, disconnect switches, and motors.
      c. Motor starters and disconnect switches, unless integral with packaged equipment.

1.2 SYSTEM DESCRIPTION

A. Performance Criteria: Install low voltage electrical wiring in accordance with Division 16 of these Specifications.

1.3 SUBMITTALS

A. Closeout:
   1. Project Record Documents: Provide two copies of record ATC.

PART 2 - PRODUCTS

2.1 GENERAL

A. System controls shall be single manufacturer's products.

2.2 COMPONENTS

A. Room Thermostats:
   1. Communicating Thermostats:
      a. Low voltage type provided with automatic change over feature for both heating and cooling stages, seven-day program with two starts and stops per day, and provisions for damper operators.
      b. Approved Manufacturers:
         1) Honeywell
         2) Robertshaw
         3) Maple Chase
         4) Other as approved before bidding.

B. Remote Room Sensor:
   1. Approved Products:
      a. Sensor with push buttons for OVERRIDE, WARMER, COOLER.
      b. Approved Manufacturers:
         1) Honeywell
         2) Robertshaw
         3) Maple Chase
         4) Other as approved before bidding.

C. Damper Actuators:
   1. Electric type equipped for Class I wiring.
   2. Shall not consume power during UNOCCUPIED cycle or use chemicals or expandable media.
   3. Have built in spring return.
   4. Approved Product:
      a. Honeywell S0524-2POS. Also shown as MS8105 1008
      b. Approved equal by other manufacturer.

2.3 MANUFACTURERS

A. Contact Information:
   1. Air Products And Controls Ltd, Pontiac, MI (888) 332-2241 or (248) 332 3900 www.ap-c.com.
   2. Functional Devices, Brea, CA (800) 888-5538
   3. Honeywell Inc, Minneapolis, MN (800) 328-5111 or (612) 951-1000. www.honeywell.com
   4. Maple Chase Co, Downers Grove, IL (800) 445-8299 or (630) 719-1550. www.invensys.com
   5. Robertshaw Control Co, Long Beach, CA (800) 232-9389 or (310) 638-6111. www.robertshaw.com

PART 3 - EXECUTION

3.1 INSTALLATION

A. Interface With Other Work:
   1. Calibrate room thermostats as required during air test and balance.
   2. Instruct air test and balance personnel in proper use and setting of control system components.

B. Mount damper actuators and actuator linkages external of airflow. Make certain dampers operate freely without binding or with actuator housing moving.

C. Sequence of Control:
   1. Programmable thermostat shall control unoccupied and occupied status of fan system based on adjustable seven day program and remote room sensor **/** push button. Fan shall run continuously in occupied mode and cycle in unoccupied mode.
   2. Adjustable heating and cooling set points shall control space temperature by activating either heating or cooling equipment. Programmable thermostat provides automatic change over between heating and cooling.
   3. Remote room sensor provides optional override of thermostat program by allowing three hour timed override of thermostat program at any time by pushing selected point on remote room sensor cover. This shall activate thermostat to occupied mode and system shall control to occupied set point.
   4. Two Sensor Averaging: In zones were two remote sensors are located, the sensors are to provide an average temperature signal to the thermostat. One sensor has OVERRIDE, WARMER, COOLER buttons. Set jumper to appropriate setting necessary to average with another sensor.

3.2 FIELD QUALITY CONTROL

A. Manufacturer's Field Service:
   1. Calibrate, adjust, and set controls for proper operation, operate systems, and be prepared to prove operation of any part of control system. This work is to be completed before pre-substantial completion inspection.
      a. Test each individual heating, cooling, and damper control for proper operation using control system.

3.3 ADJUSTING

A. Program minimum of one day=s operation into thermostat's memory function.

END OF SECTION

TABLE OF CONTENTS

SECTION 26 0500

GENERAL ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Provide labor, materials, and equipment necessary for completion of work of this Division as described in Contract Documents.

1.02 RELATED SECTIONS

A. General Conditions and Division 01 apply to this Section

1.03 SUBMITTALS

A. As-Built Drawings
   1. Provide complete set with all changes made to original drawings. Provide CADD files as well as mylar prints. Hand-drawn changes are not acceptable.
   2. Product Data
      a. Submit for the following:
         1) Wiring devices
         2) Disconnects
         3) Panelboards
         4) Lighting fixtures, poles, and associated control equipment
         5) Emergency lighting packs
         6) Lightning protection equipment
         7) Fire alarm & detection equipment
      b. Provide the following information for each item of equipment:
         1) Catalog sheets
         2) Assembly details of dimension drawings
         3) Installation instructions
         4) Manufacturer's name and catalog number
         5) Name of local supplier
         6) Name of electrical contractor
   3. Operation & Maintenance Manual
      a. Provide two copies of Operation and Maintenance Manuals.
         1) Binder - Loose-leaf type with hard cover. Title on outside of front cover and on spine.
         2) Title Page - List the following information
            (a) Name of Project
            (b) Date Project Completed
            (c) Name and Address of Architect, Electrical Engineer, General Contractor, Electrical Contractor, and Suppliers.
         3) Table of Contents -
            (a) List equipment in order that it appears in Binder.
         4) Dividers -
            (a) Provide one divider with tab for each type of equipment listed in Table of Contents. Properly label tabs.
         5) Equipment Information - Provide following information for each item of equipment
            (a) Catalog Sheets.
            (b) Assembly details or dimension drawings.
            (c) Installation, operating, and maintenance instructions.
            (d) manufacturer's name and catalog number
            (e) Name of local supplier.
         6) Furnish such information for following equipment and arrange as listed -

(a) Disconnect Switches.
(b) Wiring Devices.
(c) Lighting Fixtures.
(d) Panelboards
(e) Safety Switches
(f) Fire alarm and detection system
(g) Communications systems equipment
(h) Emergency Battery Packs

1.04 REQUIREMENTS OF REGULATORY AGENCIES

A. Furnish UL listed equipment where such label is available. Install in conformance with UL standards where applicable.

B. Install electrical work in accordance with Drawings and Specifications, edition of NEC in effect at project location, recommendations of NFPA, state and local electrical and building codes, and special codes having jurisdiction over specific portions of work. This includes, but is not limited to the following
1. 2008 National Electrical Code with applicable local amendments
2. 2006 International Fire Code
3. 2006 Life Safety Code, NFPA 101
4. 2006 International Building Code
5. In the event of conflict between Drawings, Specifications and such codes, notify Architect in writing prior to bid. A ruling will then be made by Architect in writing.
6. Obtain permits and certificates of approval from all authorities having jurisdiction over the installation and pay all fees required for scope of work being done including connection fees, impact fees, power company installation costs, etc.

1.05 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Guarantee work to be free from defects of materials and workmanship for a period of one year from date of final acceptance of building by authorities having jurisdiction.

C. Furnish owner with three written copies of Guarantee-Warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Substitutions: See Section 01 6000 - Product Requirements.
1. Where Manufacturer's names appear, other Manufacturers may be substituted upon obtaining written approval of Architect at least 10 days prior to opening of bids
2. Any prior approval of alternate equipment does not automatically exempt the supplier from meeting the intent of these specifications. Failure to comply with the operational and functional intent of these specifications may result in the total removal of the alternate system at the expense of the contractor.

PART 3 EXECUTION

3.01 EXAMINATION

A. Confirm dimensions, ratings, and specifications of equipment to be installed and coordinate these with site dimensions and with other Sections. Coordinate electrical equipment locations with other trades to maintain required working clearances and prevent encroachment into such working spaces.

B. Confirm and verify electrical power specifications (i.e., voltage, phase, amperage, etc.) and electrical equipment and material requirements for all HVAC equipment, water heaters, water

coolers, appliances, pumps, and other powered equipment provided by others, before beginning rough-in. All coordination shall be done with approved shop drawings or submittals.

3.02 INSTALLATION

A. Electrical drawings are diagrammatic. Do not scale for exact sizes or locations. Drawings are not intended to disclose absolute or unconditional knowledge of actual field conditions. Some equipment may need to be relocated from the locations indicated on the drawings to maintain working spaces around equipment. Any such coordination and relocation shall be the responsibility of the electrical contractor.

B. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom. Verify headroom clearance before ordering equipment.

C. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

E. Be prepared to relocate any outlet or device 6 feet in any direction without additional charge to the owner prior to wall, ceiling, or floor finish materials being installed.

F. Install equipment according to manufacturer's recommendations.

G. Coordinate work with other trades and install conduit and boxes to clear embedded ducts, openings, etc. and all structural features.

H. In the event of conflict between specifications and drawings, or between various areas on drawings or specifications, notify Engineer in writing in sufficient time prior to bid to prepare the supplementary drawings and specification addenda required to resolve the conflict. If the conflict is not reported timely, prior to the opening of bids, it shall be the responsibility of the Contractor to resolve the conflict and provide the installation in accordance with the governing codes and to the satisfaction of the Architect, without additional compensation. In the event of a conflict, the most stringent requirement shall govern.

3.03 COORDINATION

A. The contractor shall examine the site and observe the conditions under which the work will be done or other circumstances which will affect the contemplated work. No allowance will be made subsequently in the connection for any error or negligence on the contractor’s part.

B. Coordinate all work with Division 21, 22, & 23. Electrical Contractor shall provide all wiring and final connection to all line voltage thermostats. Thermostat provided and installed by Division 23.

C. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Section 08 31 00 - "Access Doors."

D. The contractor shall verify exact location, size and extent of all existing utilities, obstructions and/or other conditions which may affect the proposed work under the project. The contractor shall take every precaution to prevent damage to existing work and shall repair any damage as a result of this work.

E. The contractor shall verify all door swings in the field and mount switches on knob side of doors or as approved by the engineer.

F. The contractor shall carefully examine all contract drawings/specifications and be responsible for the proper fittings of materials and equipment at each location as indicated without substantial alteration. The drawings are generally diagrammatic and because of the small scale of the drawings, it is not possible to indicate all offsets, fittings and accessories which may be

required. Furnishing such fittings that are required to meet such conditions shall be furnished and installed at no cost.

G. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.

3.04 FIELD QUALITY CONTROL

A. Test systems and demonstrate equipment as working and operating properly. Rectify defects at no additional cost to Owner.

B. All work under this division shall be executed in a thorough workmanlike manner, as determined by the Engineer, by competent and experienced journeyman electricians.

C. All work shall be installed in strict conformance with all manufacturers' requirements and recommendations.

3.05 FIRE STOPPING AND SEALING

A. Seal around conduits or other wiring materials passing through fire rated walls in accordance with Architectural details and/or specifications using U.L. listed fire caulk.

3.06 TEMPORARY LIGHTING AND POWER

A. Provide, maintain and remove after construction is completed, temporary lighting adequate for workman safety and temporary power for all trades including any 3-phase power required.

B. Provide and maintain barricade lighting where required to adequately protect owner against liability for damage to public or personnel.

3.07 CUTTING AND PATCHING

A. Cut all openings required to install the work of this Division or to repair any defective work. Cost for all cutting and patching required by the work of this Division shall be included, however, the actual cutting and patching shall be under the Prime Contractor's direction. Exercise due diligence to avoid cutting openings larger than required or openings that are in the wrong locations.

B. It is the intent to minimize the amount of exposed conduit on the roof and penetrations through the roof. Install conduit below roof and up through the inside of the equipment where possible. In the event roof penetrations must be made, the conduit shall be installed through waterproof sheetmetal housings or water proof pitch pans as detailed on the drawings.

3.08 IDENTIFICATIONS

A. Provide for each panelboard, terminal cabinet, pushbutton, control switch, time clock, etc., furnished and/or installed under this Division of the Specifications, with identification as to its designation or specific function. Identification shall be a laminated, white core, black plastic nameplate with beveled edges. Lettering shall be machine-engraved, not less than 3/16 in. high, cut through the black surface to the white core. Secure nameplate to the identified item by the use of stainless steel self-tapping screws. Impressed plastic shall not be used to satisfy this requirement. Panel schedules shall be typed.

3.09 INSPECTIONS:

A. All work of this division shall be inspected periodically by the Engineer. The contractor shall notify the engineer minimum one week prior to the requested inspection date. At a minimum, inspections shall be performed upon completion of the following phases of construction -
   1. Completion of underground conduit rough-in, prior to concrete floor installation.
   2. Completion of above-grade conduit rough-in, prior to installation of wall material (gypboard).

3. Substantial completion of entire electrical system.
4. Failure to notify the engineer at the indicated times during construction may result in removal of concrete, wall board or other materials to allow a complete inspection.
5. At the request of the Engineer, the contractor shall remove panel covers, fixture lenses, ballast covers, wall plates, wiring devices, and any other items as required to allow a complete inspection and determination of compliance with the contract documents.

END OF SECTION

SECTION 26 0519

POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wire and cable for 600 volts and less.

B. Wiring connectors and connections.

1.02 RELATED SECTIONS

A. Section 26 0553 - Identification for Electrical Systems.

1.03 REFERENCES

A. NECA 1 - Standard for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.

B. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 WIRING REQUIREMENTS

A. Concealed Dry Interior Locations: Use only building wire in raceway or metal clad cable.

B. Exposed Dry Interior Locations: Use only building wire in raceway.

C. Above Accessible Ceilings: Use only building wire in raceway or metal clad cable.

D. Wet or Damp Interior Locations: Use only building wire in raceway or metal clad cable.

E. Exterior Locations: Use only building wire in raceway.

F. Underground Installations: Use only building wire in raceway, direct burial cable, or service-entrance cable.

G. Use solid conductor for feeders and branch circuits 10 AWG and smaller.

H. Use stranded conductors for control circuits.

I. Use conductor not smaller than 12 AWG for power and lighting circuits.

J. Use conductor not smaller than 16 AWG for control circuits.

K. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.

L. Conductor sizes are based on copper unless indicated as aluminum or "AL".

2.02 BUILDING WIRE

A. Description: Single conductor insulated wire.

B. Conductor: Copper.

C. Insulation Voltage Rating: 600 volts.

D. Insulation: NFPA 70, Type THHN/THWN.

2.03 METAL CLAD CABLE

A. Description: NFPA 70, Type MC.

B. Conductor: Copper.

C. Insulation Voltage Rating: 600 volts.

D. Insulation Temperature Rating: 90 degrees C.

E. Insulation Material: Thermoplastic.

F. Armor Material: Steel.

G. Armor Design: Interlocked metal tape.

2.04 WIRING CONNECTORS

A. Spring Wire Connectors:
   1. Product: Type 512, 3M tapeless steel spring wire connectors

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that mechanical work likely to damage wire and cable has been completed.

C. Verify that raceway installation is complete and supported.

D. Verify that field measurements are as indicated.

3.02 INSTALLATION

A. Install conductors in raceway unless indicated otherwise.

B. Install wire and cable securely, in a neat and workmanlike manner, as specified in NECA 1.

C. Route wire and cable as required to meet project conditions.
   1. Wire and cable routing indicated is approximate unless dimensioned.
   2. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.
   3. Include wire and cable of lengths required to install connected devices within 10 ft of location shown.

D. Use wiring methods indicated.

E. Conductors shall be continuous from outlet to outlet.

F. Pull all conductors into raceway at same time.

G. Use suitable wire pulling lubricant for building wire 4 AWG and larger.

H. Protect exposed cable from damage.

I. Support cables above accessible ceiling, using spring metal clips or metal cable ties to support cables from structure or ceiling suspension system. Do not rest cable on ceiling panels.

J. Use suitable cable fittings and connectors.

K. Neatly train and lace wiring inside boxes, equipment, and panelboards.

L. Clean conductor surfaces before installing lugs and connectors.

M. Where common neutral is run for two home run circuits, connect phase conductors to breakers in panel which are attached to separate phase legs in order that neutral conductors will carry only unbalanced current.

N. Branch circuit neutral conductors shall be one size larger than the phase conductors unless specifically noted otherwise.

O. Run conductors of different voltage systems in separate conduits.

P. Conductors size #10 and smaller shall be colored throughout.

Q. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

R. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.

S. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

T. Identify and color code wire and cable under provisions of Section 26 0553. Identify each conductor with its circuit number or other designation indicated.

END OF SECTION

SECTION 26 0526

GROUNDING AND BONDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding components.

B. Provide all components necessary to complete the grounding system(s) consisting of:
   1. Metal underground water pipe.
   2. Metal frame of the building.
   3. Concrete-encased electrode.
   4. Rod electrodes.

1.02 REFERENCES

A. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2007.

B. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

1.03 PERFORMANCE REQUIREMENTS

A. Grounding System Resistance: 5 ohms.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 ELECTRODES

A. Rod Electrodes: Copper.
   1. Diameter: 3/4 inch.
   2. Length: 10 feet.

B. Foundation Electrodes: 2/0 AWG.

2.02 CONNECTORS AND ACCESSORIES

A. Mechanical Connectors: Bronze.

B. Wire: Stranded copper with green insulation.

C. Insulated grounding bushings: Plated malleable iron body with 150 degree centigrade molded plastic insulating throat, lay-in grounding lug with hardened stainless steel fasteners.

D. Grounding Electrode Conductor: Size to meet NFPA 70 requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions prior to beginning work.

B. Verify that final backfill and compaction has been completed before driving rod electrodes.

3.02 INSTALLATION

A. Install ground electrodes at locations indicated. Install additional rod electrodes as required to achieve specified resistance to ground.

B. Pull ground conductors in all non-metallic raceways, flexible conduit, and liquid tight flexible conduit. Use same size ground as phase conductors up through #10 AWG. Use NEC Table 250-66 for all others unless noted otherwise on Drawings.

C. Provide grounding well pipe with cover at each rod location. Install well pipe top flush with finished grade.

D. Provide grounding electrode conductor and connect to reinforcing steel in foundation footing where indicated. Bond steel together.

E. Provide bonding jumpers across expansion and deflection couplings in conduit runs, across pipe connections at water meters, and across dielectric couplings in metallic cold water piping systems

F. Provide bonding jumpers from all wiring device grounding terminals to metal backbox.

G. Provide bonding to meet requirements described in Quality Assurance.

H. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

3.03 FIELD QUALITY CONTROL

A. Provide field testing in accordance with Section 01 4000.

B. Inspect and test in accordance with NETA STD ATS except Section 4.

END OF SECTION

SECTION 26 0529

HANGERS AND SUPPORTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Conduit and equipment supports.

B. Anchors and fasteners.

1.02 REFERENCES

A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.

B. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

1.03 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 MATERIALS

A. Hangers, Supports, Anchors, and Fasteners - General: Corrosion-resistant materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.

B. Supports: Fabricated of structural steel or formed steel members; galvanized or painted.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install hangers and supports as required to adequately and securely support electrical system components, in a neat and workmanlike manner, as specified in NECA 1.
   1. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
   2. Obtain permission from Architect before drilling or cutting structural members.

B. Rigidly weld support members or use hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.

C. Install surface-mounted cabinets and panelboards with minimum of four anchors.

D. In wet and damp locations use steel channel supports to stand cabinets and panelboards 1 inch off wall.

E. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

END OF SECTION

SECTION 26 0534

CONDUIT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Conduit, fittings and conduit bodies.

1.02 RELATED SECTIONS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 0529 - Hangers and Supports for Electrical Systems.

C. Section 26 0553 - Identification for Electrical Systems.

D. Section 26 0537 - Boxes.

1.03 REFERENCES

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.

B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.

C. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.

D. NECA 101 - Standard for Installing Steel Conduit (Rigid, IMC, EMT); National Electrical Contractors Association; 2006.

E. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2007.

F. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit; National Electrical Manufacturers Association; 2003.

G. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing; National Electrical Manufacturers Association; 2004.

H. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept conduit on site. Inspect for damage.

B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

C. Protect PVC conduit from sunlight.

PART 2 PRODUCTS

2.01 CONDUIT REQUIREMENTS

A. Conduit Size: Comply with NFPA 70.
   1. Minimum Size: 1/2 inch unless otherwise specified.

B. Underground Installations:
   1. In or Under Slab on Grade: Use rigid steel conduit, intermediate metal conduit, or thickwall non-metallic conduit.
   2. Minimum Size: 3/4 inch.

C. Outdoor Locations Above Grade: Use rigid steel conduit or intermediate metal conduit.

D. In Slab Above Grade:

E. Wet and Damp Locations: Use rigid steel conduit, intermediate metal conduit, or electrical metallic tubing.

F. Dry Locations:
   1. Concealed: Use rigid steel conduit, intermediate metal conduit, or electrical metallic tubing.
   2. Exposed: Use rigid steel conduit, intermediate metal conduit, or electrical metallic tubing.

2.02 METAL CONDUIT

A. Rigid Steel Conduit: ANSI C80.1.

B. Intermediate Metal Conduit (IMC): Rigid steel.

C. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit.

2.03 FLEXIBLE METAL CONDUIT

A. Description: Interlocked steel construction.

B. Fittings: NEMA FB 1.

2.04 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Description: Interlocked steel construction with PVC jacket.

B. Fittings: NEMA FB 1.

2.05 ELECTRICAL METALLIC TUBING (EMT)

A. Description: ANSI C80.3; galvanized tubing.

B. Fittings and Conduit Bodies: NEMA FB 1; steel or malleable iron compression type.

2.06 NONMETALLIC CONDUIT

A. Description: NEMA TC 2; Schedule 40 PVC.

B. Fittings and Conduit Bodies: NEMA TC 3.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on drawings.

B. Verify routing and termination locations of conduit prior to rough-in.

C. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

3.02 INSTALLATION

A. Install conduit securely, in a neat and workmanlike manner, as specified in NECA 1.

B. Install steel conduit as specified in NECA 101.

C. Install nonmetallic conduit in accordance with manufacturer's instructions.

D. Arrange supports to prevent misalignment during wiring installation.

E. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

F. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.

G. Fasten conduit supports to building structure and surfaces under provisions of Section 26 0529.

H. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

I. Do not attach conduit to ceiling support wires.

J. Arrange conduit to maintain headroom and present neat appearance.

K. Route exposed conduit parallel and perpendicular to walls.

L. Route conduit installed above accessible ceilings parallel and perpendicular to walls.

M. Route conduit in and under slab from point-to-point.

N. Maintain adequate clearance between conduit and piping.

O. Cut conduit square using saw or pipecutter; de-burr cut ends.

P. Bring conduit to shoulder of fittings; fasten securely.

Q. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.

R. Use conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations.

S. Install insulated bushings on each end of conduit 1 1/4 inches in diameter and larger.

T. Bending of PVC shall be by hot box.

U. Install no more than equivalent of three 90 degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one shot bender to fabricate bends in metal conduit larger than 2 inch size.

V. Run a minimum of one 3/4 inch spare conduit for every three single pole spare circuit breakers or spaces, but not less than three conduits from each new panel to ceiling access area above and below (if applicable) panel and cap so no foreign matter will enter conduit while not in use.

W. Coat buried rigid or IMC conduit with approved asphaltic compound or wrap with two layers of approved corrosion protection tape.

X. Conduit in concrete slabs shall not exceed 3/4 inch I.P. size and shall be spaced no closer than 8 inches on center except at panel and junction boxes where they are to be spread as widely as possible; special framing may be required where conduits enter a panel board.

Y. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

Z. When PVC conduit is used, turn up with rigid galvanized elbhws and risers and provide equipment grounding conductor in accordance with NEC, Article 250

AA. Provide suitable fittings to accommodate expansion and deflection where conduit crosses seismic.

AB. Provide long-sweep elbows for telephone and power service entrance conduits.

AC. Provide suitable pull string in each empty conduit except sleeves and nipples.

AD. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

AE. Ground and bond conduit under provisions of Section 26 0526.

AF. Identify conduit under provisions of Section 26 0553.

3.03 PROHIBITED PROCEDURES

A. Use of wooden plugs inserted in concrete or masonry units as base for fastening conduits, tubing, boxes, cabinets, or other equipment.

B. Torches for bending PVC conduit.

C. Installation of conduit or tubing which has been crushed or deformed.

END OF SECTION

SECTION 26 0537

BOXES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall and ceiling outlet boxes.

B. Pull and junction boxes.

1.02 RELATED SECTIONS

A. Section 07 8400 - Firestopping.

B. Section 26 2726 - Wiring Devices: Wall plates in finished areas.

1.03 REFERENCES

A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.

B. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2007.

C. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; National Electrical Manufacturers Association; 2003.

D. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports; National Electrical Manufacturers Association; 2003.

E. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Provide products listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 OUTLET BOXES

A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
   1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required.

B. Nonmetallic Outlet Boxes: NEMA OS 2.

C. Cast Boxes: NEMA FB 1, Type FD, aluminum. Provide gasketed cover by box manufacturer. Provide threaded hubs.

D. Wall Plates for Finished Areas: As specified in Section 26 2726.

2.02 FLOOR BOXES

A. Approved Manufacturers -
   1. Concrete Floors
      a. 1-Gang: Hubbell PFBRG1 Box; PFBRFGY1 Carpet Flange w/collar, PFBR826GY cover plate (1)
      b. 2-Gang: Hubbell PFBRG2 Box; PFBRFGY2 Carpet Flange w/collars, PFBR826GY cover plate (2).

c. 3-Gang: Hubbell PFBRG3 Box; PFBRFGY3 Carpet Flange w/collars, PFBR826GY cover plate (3).

2.03 PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify locations of floor boxes and outlets in offices and work areas prior to rough-in.

3.02 INSTALLATION

A. Label all circuits and source panels on exterior of each junction box.

B. Install boxes securely, in a neat and workmanlike manner, as specified in NECA 1.

C. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and as required by NFPA 70.

D. Set wall mounted boxes at elevations to accommodate mounting heights indicated.

E. Electrical boxes are shown on Drawings in approximate locations unless dimensioned.
   1. Adjust box locations up to 10 feet if required to accommodate intended purpose.

F. Orient boxes to accommodate wiring devices oriented as specified in Section 26 2726.

G. Maintain headroom and present neat mechanical appearance.

H. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

I. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.

J. Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.

K. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.

L. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.

M. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

N. Use flush mounting outlet box in finished areas.

O. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

P. Do not install flush mounting box back-to-back in walls; provide minimum 6 inches separation. Provide minimum 24 inches separation in acoustic rated walls.

Q. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

R. Use stamped steel bridges to fasten flush mounting outlet box between studs.

S. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

T. Use adjustable steel channel fasteners for hung ceiling outlet box.

U. Do not fasten boxes to ceiling support wires.

V. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches of box.

W. Use gang box where more than one device is mounted together. Do not use sectional box.

X. Use gang box with plaster ring for single device outlets.

Y. Use cast outlet box in exterior locations exposed to the weather and wet locations.

3.03 CLEANING

A. Clean interior of boxes to remove dust, debris, and other material.

B. Clean exposed surfaces and restore finish.

END OF SECTION

SECTION 26 0553

ELECTRICAL SYSTEMS IDENTIFICATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates and labels.

B. Wire and cable markers.

1.02 REFERENCES

A. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

1.03 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.01 NAMEPLATES AND LABELS

A. Nameplates: Engraved three-layer laminated plastic, black letters on white background.

B. Locations:
   1. Each electrical distribution and control equipment enclosure.

C. Letter Size:
   1. Use 1/4 inch letters for identifying grouped equipment and loads.

D. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background. Use only for identification of individual wall switches and receptacles, control device stations, and _____.

2.02 WIRE MARKERS

A. Description: Cloth type wire markers.

B. Legend:
   1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.

2.03 UNDERGROUND WARNING TAPE

A. Description: 4 inch wide plastic tape, detectable type colored red with suitable warning legend describing buried electrical lines.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive nameplates and labels.

3.02 INSTALLATION

A. Install nameplates and labels parallel to equipment lines.

B. Secure nameplates to equipment front using screws or adhesive.

C. Secure nameplates to inside surface of door on panelboard that is recessed in finished locations.

D. Identify underground conduits using underground warning tape. Install one tape per trench at 3 inches below finished grade.

END OF SECTION

SECTION 26 0919

ENCLOSED CONTACTORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Lighting contactors.

1.02 REFERENCES

A. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC; National Electrical Manufacturers Association; 2000 (R2005).

B. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2007.

C. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

1.03 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 LIGHTING CONTACTORS

A. Description: NEMA ICS 2, magnetic lighting contactor.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install enclosed contactors where indicated, in accordance with manufacturer's instructions.

B. Install enclosed contactors plumb. Provide supports in accordance with Section 26 0529.

C. Provide engraved plastic nameplates; refer to Section 26 0553 for product requirements and location.

3.02 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01 4000.

B. Inspect and test in accordance with NETA STD ATS, except Section 4.

C. Perform applicable inspections and tests listed in NETA STD ATS, Section 7.16.1.

END OF SECTION

SECTION 26 2416

PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Lighting and appliance panelboards.

1.02 RELATED SECTIONS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 0553 - Identification for Electrical Systems.

1.03 REFERENCES

A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.

B. NEMA PB 1 - Panelboards; National Electrical Manufacturers Association; 2006.

C. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; National Electrical Manufacturers Association; 2007.

D. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2007.

E. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Eaton Electrical/Cutler-Hammer: www.eatonelectrical.com.

B. GE Industrial: www.geindustrial.com.

C. Square D: www.squared.com.

D. Siemens: www.siemens.com

E. Substitutions: See Section 01 6000 - Product Requirements.

2.02 LIGHTING AND APPLIANCE PANELBOARDS

A. Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.

B. Panelboard Bus: Aluminum, ratings as indicated. Provide copper ground bus in each panelboard; provide insulated ground bus where scheduled.

C. Minimum fully-rated Integrated Short Circuit Rating:
   1. 240 Volt Panelboards: 22,000 amperes rms symmetrical.

D. Molded Case Circuit Breakers: Thermal magnetic trip circuit breakers, bolt-on type, with common trip handle for all poles; UL listed.
   1. Type SWD for lighting circuits.
   2. Type HACR for air conditioning equipment circuits.
   3. Class A ground fault interrupter circuit breakers where scheduled.
   4. Do not use tandem circuit breakers.

E. Enclosure: NEMA PB 1, Type 1.

F. Cabinet Box: 6 inches deep, 20 inches wide for 240 volt and less panelboards, 20 inches wide for 480 volt panelboards.

G. Covers: Hinged trim - trim has piano hinge down one side. Door opens by single latch; Entire trim opens by removing screws.

H. Provide a minimum of six spare 20 amp, 1-pole breakers in each branch panel.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install panelboards in accordance with NEMA PB 1.1 and NECA 1.

B. Install panelboards plumb. Install recessed panelboards flush with wall finishes.

C. Height: 6 feet to top of panelboard; install panelboards taller than 6 feet with bottom no more than 4 inches above floor.

D. Provide filler plates for unused spaces in panelboards.

E. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.

F. Provide protection for installed breakers during construction to prevent physical damage, paint splatters, etc.

G. Arrange conductors neatly within enclosure, and secure with suitable nylon ties.

H. All panelboards shall be keyed alike.

I. Provide engraved plastic nameplates under the provisions of Section 26 0553.

J. Provide spare conduits out of each recessed panelboard to an accessible location above ceiling. Identify each as SPARE.
   1. Minimum spare conduits: 5 empty 1 inch.

K. Ground and bond panelboard enclosure according to Section 26 0526.

3.02 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01 4000.

B. Inspect and test in accordance with NETA STD ATS, except Section 4.

C. Perform inspections and tests listed in NETA STD ATS, Section 7.5 for switches, Section 7.6 for circuit breakers.

3.03 ADJUSTING

A. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

END OF SECTION

SECTION 26 2701

ELECTRICAL SERVICE ENTRANCE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Meter bases.

1.02 REFERENCES

A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.

B. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

1.03 SYSTEM DESCRIPTION

A. System Characteristics: 120/240 volts, single phase, two-wire, 60 Hertz.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide ratings and dimensions of transformer cabinets and meter bases.

C. Submit utility company-prepared drawings.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with utility company written requirements and NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 PRE-INSTALLATION MEETING

A. Convene one week prior to commencing work of this section. Review service entrance requirements and details with Utility Company representative.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. GE Industrial: www.geindustrial.com.

B. Milbank Manufacturing: www.milbankmfg.com.

C. Square D: www.squared.com.

D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 COMPONENTS

A. Meter Base: Rated 200 amperes continuous duty with the following features:
   1. Lever or link bypass on direct-meter sockets as required by the serving agency.

B. Utility Transformer Pad: Concrete reinforced as specified by power company.

C. Other Components: As required by utility company.

PART 3 EXECUTION

3.01 PREPARATION

A. Arrange with utility company to obtain permanent electric service to the Project.

B. Verify that field measurements are as indicated on utility company drawings.

3.02 INSTALLATION

A. Install transformer pad and meter base as required by utility company.

B. Install securely, in a neat and workmanlike manner, as specified in NECA 1.

END OF SECTION

SECTION 26 2717

EQUIPMENT WIRING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical connections to equipment.

1.02 RELATED SECTIONS

A. Section 26 0534 - Conduit.

B. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables (600 V and Less).

C. Section 26 0537 - Boxes.

D. Section 26 2726 - Wiring Devices.

1.03 REFERENCES

A. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; 1999 (R 2005).

B. NEMA WD 6 - Wiring Devices - Dimensional Requirements; National Electrical Manufacturers Association; 2002.

C. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.05 COORDINATION

A. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.

B. Determine connection locations and requirements.

C. Sequence rough-in of electrical connections to coordinate with installation of equipment.

D. Sequence electrical connections to coordinate with start-up of equipment.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
   1. Colors: Conform to NEMA WD 1.
   2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
   3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

B. Disconnect Switches: As specified in Section 26 2818.

C. Wiring Devices: As specified in Section 26 2726.

D. Flexible Conduit: As specified in Section 26 0534.

E. Wire and Cable: As specified in Section 26 0519.

F. Boxes: As specified in Section 26 0537.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

A. Make electrical connections in accordance with equipment manufacturer's instructions.

B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.

C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

D. Provide receptacle outlet to accommodate connection with attachment plug.

E. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

F. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

G. Install terminal block jumpers to complete equipment wiring requirements.

H. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

END OF SECTION

SECTION 26 2726

WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall switches.

B. Wall dimmers.

C. Receptacles.

D. Device plates and decorative box covers.

E. Floor box service fittings.

1.02 RELATED SECTIONS

A. Section 26 0537 - Boxes.

1.03 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.04 EXTRA MATERIALS

A. See Section 01 6000 - Product Requirements, for additional provisions.

B. Furnish two of each style, size, and finish wall plate.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 WALL SWITCHES

A. Wall Switches: General Duty, AC only general-use snap switch, complying with NEMA WD 6 and WD 1.
   1. Body and Handle: plastic with toggle handle.
   2. Ratings: Match branch circuit and load characteristics.

B. Verify color with Architect before ordering devices.

C. Switch Types: Single pole, double pole, 3-way, and 4-way.

D. Approved Manufacturer
   1. Hubbell: CS1221 series
   2. Equal as approved by Architect prior to bidding

2.03 OCCUPANCY SENSORS

A. Ultrasonic Type
   1. Complete with sensor and combined relay / control transformer.
   2. Ceiling mount
   3. Approved Manufacturers and Models -
      a. Honeywell -
         1) Sensor - EL7612A1001
         2) Relay / Transformer - EL7621A1002
      b. Novitas -

1) Sensor - 01-083
2) Relay / Transformer - 13-012

c. Pass & Seymour -
1) Sensor - US1001
2) Relay / Transformer - PWP120

d. Unenco -
1) Sensor - C-600-R-QT1
2) Relay / Transformer - 211-QT1

e. Watt Stopper -
1) Sensor - W-500A
2) Relay / Transformer - A120-E

B. Passive Infrared Type with Integral Override Switch
1. Wall mount
2. 180 deg coverage
3. Integral light level sensor
4. Adjustable sensitivity from 20% to 100%
5. Time delay - 30 sec to 30 minutes
6. Approved Manufacturers -
a. Novitas

2.04 RECEPTACLES

A. Receptacles: General duty, complying with NEMA WD 6 and WD 1.
1. Device Body: plastic.
2. Configuration: NEMA WD 6, type as specified and indicated.
3. Convenience Receptacles: Type 5 to 15.
4. Approved Manufacturers
a. Hubbell: CR5252 series
b. Equal as approved by Architect prior to bidding.

B. GFCI Receptacles: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.
1. Approved Manufacturer
a. Hubbell: GF5352I
b. Leviton: 6899-I

2.05 WALL PLATES

A. Decorative Cover Plates: nylon.

B. Jumbo Cover Plates: smooth plastic.

C. Weatherproof Cover Plates: Corrosion resistant, in-use type
1. Pass & Seymour: WIUC10-GL

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that outlet boxes are installed at proper height.

B. Verify that wall openings are neatly cut and will be completely covered by wall plates.

C. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean debris from outlet boxes.

3.03 INSTALLATION

A. Install securely, in a neat and workmanlike manner, as specified in NECA 1.

B. Install devices plumb and level.

C. Install switches with OFF position down.

D. Mount wall switches on lock side of doors not more than 12 inches from trim and in accordance with barrier free design standards. Prior to rough-in, coordinate with architectural drawings to determine lock-side of door.

E. Label source panel and circuit number on the back of all device cover plates.

F. Install receptacles with grounding pole on bottom.

G. Connect wiring device grounding terminal to outlet box with bonding jumper.

H. Install decorative plates on switch, receptacle, and blank outlets in finished areas.

I. Connect wiring devices by wrapping conductor around screw terminal.

J. Use jumbo size plates for outlets installed in masonry walls.

K. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

L. Provide GFI receptacles in areas required by the National Electrical Code whether indicated on the drawings or not.

3.04 INTERFACE WITH OTHER PRODUCTS

A. Install wall switch 48 inches above finished floor.

B. Install convenience receptacle 18 inches above finished floor.

C. Install convenience receptacle 6 inches above counter.

3.05 FIELD QUALITY CONTROL

A. Perform field inspection, testing, and adjusting in accordance with Section 01 4000.

B. Inspect each wiring device for defects.

C. Operate each wall switch with circuit energized and verify proper operation.

D. Verify that each receptacle device is energized.

E. Test each receptacle device for proper polarity.

F. Test each GFCI receptacle device for proper operation.

3.06 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.07 CLEANING

A. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

SECTION 26 2818

ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fusible switches.

B. Nonfusible switches.

1.02 REFERENCES

A. NEMA FU 1 - Low Voltage Cartridge Fuses; National Electrical Manufacturers Association; 2002.

B. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum); National Electrical Manufacturers Association; 2001 (R2006).

C. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2007.

D. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

1.03 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Same as panelboard manufacturer.

2.02 COMPONENTS

A. Fusible Switch Assemblies: NEMA KS 1, Type HD enclosed load interrupter knife switch.
   1. Externally operable handle interlocked to prevent opening front cover with switch in ON position.
   2. Handle lockable in OFF position.
   3. Fuse clips: Designed to accommodate NEMA FU1, Class R fuses.

B. Nonfusible Switch Assemblies: NEMA KS 1, Type HD enclosed load interrupter knife switch.
   1. Externally operable handle interlocked to prevent opening front cover with switch in ON position.
   2. Handle lockable in OFF position.

C. Enclosures: NEMA KS 1.
   1. Interior Dry Locations: Type 1.
   2. Exterior Locations: Type 3R.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install fuses in fusible disconnect switches.

C. Label equipment, such as Fan Coil Unit FC-1. Label disconnects to indicate equipment served. Use 1/16 inch thick laminated plastic composition material with contrasting color core. Engraved letter shall be 1/4 inch high. Attach labels with screws.

D. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

3.02 FIELD QUALITY CONTROL

A. Perform field inspection in accordance with Section 01 4000.

B. Inspect and test in accordance with NETA STD ATS, except Section 4.

C. Perform inspections and tests listed in NETA STD ATS, Section 7.5.1.2.

END OF SECTION

SECTION 26 5100

INTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior luminaires and accessories.

B. Emergency lighting units.

C. Exit signs.

D. Ballasts.

E. Fluorescent dimming ballasts and controls.

F. Fluorescent lamp emergency power supply.

G. Lamps.

H. Luminaire accessories.

1.02 REFERENCES

A. ANSI C82.4 - American National Standard for Ballasts for High-Intensity-Discharge and Low Pressure Sodium Lamps (Multiple-Supply Type); 2002.

B. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; National Electrical Contractors Association; 2006.

C. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

D. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures; National Fire Protection Association; 2006.

1.03 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70 and NFPA 101.

B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.04 EXTRA MATERIALS

A. See Section 01 6000 - Product Requirements, for additional provisions.

B. Furnish 10% of the total of each plastic lens type used on the project, minimum two of each type. Deliver to owner in protected, factory packaging.

C. Furnish 10% replacement lamps of the total of each lamp type, minimum two of each type. Deliver to owner in protected, factory packaging.

D. Furnish two of each ballast type.

PART 2 PRODUCTS

2.01 LUMINAIRES

A. Furnish products as indicated in Schedule included on the Drawings.

B. Emergency Lighting Units: Self-contained fluorescent emergency lighting unit.
   1. Battery: 6 volt, nickel-cadmium type, with 1.5 hour capacity.

2. Battery Charger: Dual-rate type, with sufficient capacity to recharge discharged battery to full charge within twelve hours.
3. Indicators: Lamps to indicate AC ON and RECHARGING.
4. TEST switch: Transfers unit from external power supply to integral battery supply.

2.02 BALLASTS AND CONTROL UNITS

A. Fluorescent Ballasts: electronic solid state, suitable for lamps specified.
1. UL listed and labeled
2. Minimum power factor of 90 percent.
3. Maximum total harmonic distortion of 10 percent.
4. Audible noise level lower than quietest CBM certified ballast for same application.
5. Transient protection in accordance with ANSI 62.41-1984.
6. Comply with FCC Rules Part 18, 15J.
7. Maximum crest factor of 1.7.
8. One year full replacement warranty including labor allowance for replacement.
9. Voltage: Match luminaire voltage.
10. Certify fluorescent ballast design and construction by Certified Ballast Manufacturers, Inc.
11. Substitutions: See Section 01 6000 - Product Requirements.

B. High Intensity Discharge (HID) Ballasts: ANSI C82.4, metal halide lamp ballast, suitable for lamp specified.
1. UL listed and labeled.
2. Pulse Start.
3. ANSI type M-144.
4. Maximum crest factor 1.6.
5. One year full replacement warranty including labor allowance for replacement.

C. Fluorescent Lamp Emergency Power Supply: Emergency battery power supply suitable for installation in ballast compartment of fluorescent luminaire.
1. Lamp Ratings: One F32/T8.
2. Battery: Sealed lead calcium type, rated for 10 year life.
3. Include TEST switch and AC ON indicator light, installed to be operable and visible from the outside of an assembled luminaire.
4. Shall operate one lamp at approximately 1400 lumens initially and not less than 1000 lumens after 90 minutes.

D. Provide zero degree rated ballasts on all exterior fixtures without additional cost to owner.

2.03 LAMPS

A. Manufacturers:
1. GE Lighting: www.gelighting.com.
2. Philips Lighting Co of NA: www.lighting.philips.com.

B. Lamp Types: As specified for each luminaire.

C. Provide 130-volt incandescent lamps.

PART 3 EXECUTION

3.01 INSTALLATION

A. Mount fixtures as called for on drawings. Determine type of ceiling being installed in each space and furnish fixtures suitable for exact type, including roof/floor or ceiling/floor fire rated design with fire tenting required by Architect. All coordination and materials to be provided without additional cost to owner.

B. Review lighting drawings and confirm ballast voltages for each fixture, or need for two ballasts to accommodate dual-level switching, or need for dimming ballasts to interface with dimming control, before ordering. Contractor shall not be eligible for additional compensation if fixtures are delivered with incorrect voltage ratings or too few ballasts, or non-dimming ballasts, as a result of inaccurate catalog numbers on drawings.

C. Provide all necessary supports, brackets, adapters and miscellaneous equipment for mounting and installation of fixtures.

D. Install fixtures securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting).

E. Install suspended luminaires and exit signs using pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.

F. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.

G. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.

H. Exposed Grid Ceilings: Support surface mounted luminaires in grid ceiling directly from building structure.

I. Install recessed luminaires to permit removal from below.

J. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.

K. Install clips to secure recessed grid-supported luminaires in place.

L. Install wall mounted luminaires, emergency lighting units, and exit signs at height as indicated on Drawings.

M. Install accessories furnished with each luminaire.

N. Connect luminaires and exit signs to branch circuit outlets provided under Section 26 0537 using flexible conduit.

O. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

P. Bond products and metal accessories to branch circuit equipment grounding conductor.

Q. Install specified lamps in each emergency lighting unit, exit sign, and luminaire.

3.02 FIELD QUALITY CONTROL

A. Perform field inspection in accordance with Section 01 4000.

B. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.03 ADJUSTING

A. Aim and adjust luminaires as directed.

B. Position exit sign directional arrows as indicated.

3.04 CLEANING

A. Clean electrical parts to remove conductive and deleterious materials.

B. Remove dirt and debris from enclosures.

C. Clean finishes and touch up damage.

3.05 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate luminaire operation for minimum of 8 hours.

3.06 PROTECTION

A. Relamp luminaires that have failed lamps at Substantial Completion.

END OF SECTION

SECTION 26 5600

EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior luminaires and accessories.

B. Poles.

1.02 REFERENCES

A. ANSI C82.4 - American National Standard for Ballasts for High-Intensity-Discharge and Low Pressure Sodium Lamps (Multiple-Supply Type); 2002.

B. ANSI O5.1 - American National Standard for Wood Poles -- Specifications and Dimensions; 2002.

C. NECA/IESNA 501 - Recommended Practice for Installing Exterior Lighting Systems; 2006.

D. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.

C. Product Data: Provide dimensions, ratings, and performance data.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store and handle solid wood poles in accordance with ANSI O5.1.

1.06 COORDINATION

A. Furnish bolt templates and pole mounting accessories to installer of pole foundations.

1.07 EXTRA MATERIALS

A. See Section 01 6000 - Product Requirements, for additional provisions.

B. Furnish two of each type and wattage lamp installed.

PART 2 PRODUCTS

2.01 LUMINAIRES

A. Furnish products as indicated in Schedule included on the Drawings.

B. Substitutions: See Section 01 6000 - Product Requirements.

2.02 BALLASTS

A. High Intensity Discharge (HID) Ballasts: ANSI C82.4, mercury vapor lamp ballast, suitable for lamp specified.

1. Voltage: Match luminaire voltage.

2.03 LAMPS

A. Manufacturers:
   1. GE Lighting: www.gelighting.com.
   2. Philips Lighting Co of NA: www.lighting.philips.com.
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. Lamp Types: As specified for each luminaire.

2.04 POLES

A. Poles: Steel.
   1. Shape: Square.
   2. Base Diameter: 6 inches.
   3. Height: As indicated.
   4. Base: Breakaway transformer type.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install fixtures securely, in a neat and workmanlike manner, as specified in NECA 501.

B. Provide concrete bases for lighting poles at locations indicated, in accordance with Section 03 3000.

C. Install poles plumb.
   1. Provide double nuts to adjust plumb.
   2. Grout around each base.

D. Install lamps in each luminaire.

E. Bond luminaires, metal accessories, and metal poles to branch circuit equipment grounding conductor.

3.02 FIELD QUALITY CONTROL

A. Perform field inspection, testing, and adjusting in accordance with Section 01 4000.

B. Operate each luminaire after installation and connection. Inspect for improper connections and operation.

3.03 ADJUSTING

A. Aim and adjust luminaires to provide illumination levels and distribution indicated on Drawings.

3.04 CLEANING

A. Clean electrical parts to remove conductive and deleterious materials.

B. Remove dirt and debris from enclosure.

C. Clean finishes and touch up damage.

3.05 CLOSEOUT ACTIVITIES

A. Relamp luminaires that have failed lamps at Substantial Completion.

3.06 SCHEDULE - See Drawings

END OF SECTION

SECTION 27 1005

STRUCTURED CABLING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cabling and pathways inside building(s).

B. Distribution frames, cross-connection equipment, enclosures, racks, and outlets.

C. Modular jacks and device plates.

D. Grounding and bonding the telecommunications distribution system.

1.02 RELATED SECTIONS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems: Electrical system grounding and bonding.

B. Section 26 0534 - Conduit.

1.03 REFERENCES

A. CEA-310 - Cabinets, Racks, Panels, and Associated Equipment; Consumer Electronics Association; Revision E, 2005.

B. NFPA 70 - National Electrical Code; 2008.

C. TIA/EIA-568-B.1 - Commercial Building Telecommunications Cabling Standard - Part 1: General Requirements; Rev B, 2001; Addenda 1-7.

D. TIA/EIA-568-B.2 - Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted Pair Cabling Components; Rev B, 2001; Addenda 1-11.

E. TIA-569 - Commercial Building Standard for Telecommunications Pathways and Spaces; Rev B, 2004.

F. TIA/EIA-606 - Administration Standard for the Telecommunications Infrastructure; Rev A, 2002.

G. ANSI/J-STD-607 - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications; Rev A, 2002.

H. UL 444 - Communications Cables; 2002.

I. UL 1863 - Standard for Communications-Circuit Accessories; 2004.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: At least 3 years experience manufacturing products of the type specified.

B. Installer Qualifications: A company having at least 5 Years experience in the installation and testing of the type of system specified, and:
   1. Employing a BICSI Registered Communications Distribution Designer (RCDD).
   2. Supervisors and installers factory certified by manufacturers of products to be installed.

1.05 WARRANTY

A. A Lifetime Performance Warranty covering all components, equipment and workmanship shall be submitted in writing with system documentation. The warranty period shall begin on the system's first use by the owner.

B. The project must be pre-registered with Manufacturer before installation has begun.

C. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

D. Correct defective Work within a 2 year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Approved Cabling and Equipment Solutions:
   1. Nextlan
   2. Commscope Uniprise
   3. Equal as approved by Architect - All solutions must be end-to-end and be able to show shared engineering resources.

2.02 SYSTEM DESIGN

A. Provide a complete, warrentied, end-to-end, permanent system of cabling and pathways for voice and data communications, including cables, conduits and wireways, pull wires, support structures, patch panels, enclosures, racks and cabinets, and outlets.
   1. Comply with TIA/EIA-568 and TIA/EIA-569, latest editions.
   2. Provide fixed cables and pathways that comply with NFPA 70 and ANSI/J-STD-607 and are UL listed or third party independent testing laboratory certified.
   3. Provide connection devices that are rated for operation under conditions of 32 to 140 degrees F at relative humidity of 0 to 95 percent, noncondensing.
   4. In this project, the term plenum is defined as return air spaces above ceilings, inside ducts, under raised floors, and other air-handling spaces.

B. Capacity:
   1. Building Entrance: By others.
   2. Horizontal Cabling: Copper.
   3. Offices and Work Areas: Provide one voice outlet and two data outlets in each work area.
   4. Provide additional outlets where indicated on drawings.

C. Main Distribution Frame (MDF): Centrally located support structure for terminating cables that extend to telecommunications outlets, functioning as point of presence to external service provider.
   1. Locate main distribution frame as indicated on the drawings.
   2. Capacity: As required to terminate all cables required by design criteria plus minimum 25 percent spare space.

D. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".

2.03 PATHWAYS

A. Conduit: As specified in Section 26 0534; provide pull cords in all conduit; minimum size 3/4".

B. Underground Service Entrance: PVC, Type EPC-40 conduit.

2.04 COPPER CABLE AND TERMINATIONS

A. Copper Horizontal Cable: TIA/EIA-568 Category 6 solid conductor unshielded twisted pair (UTP), 23 AWG, 100 ohm; 4 individually twisted pairs; covered with blue jacket and complying with all relevant parts of and addenda to latest edition of TIA/EIA-568 and UL 444.
   1. In locations other than in plenums, provide NFPA 70 type CMG general purpose, CMR riser-rated, or type CMP plenum-rated cable.
   2. In plenums, provide NFPA 70 type CMP plenum-rated cable.

B. Copper Cable Terminations: Insulation displacement connection (IDC) type using appropriate tool; use screw connections only where specifically indicated.

C. Jacks and Connectors: RJ-45, non-keyed, terminated with 110-style insulation displacement connectors; high impact thermoplastic housing; complying with same standard as specified horizontal cable and UL 1863.
   1. Performance: 500 mating cycles.
   2. Voice and Data Jacks: 4-pair, pre-wired to T568A configuration, with color-coded indications for T568B configuration.

2.05 CROSS-CONNECTION EQUIPMENT

A. Connector Blocks for Category 5e and Up Cabling: Type 110 insulation displacement connectors; capacity sufficient for cables to be terminated plus 25 percent spare.

B. Patch Panels for Copper Cabling: Sized to fit EIA standard 19 inch wide equipment racks; 0.09 inch thick aluminum; cabling terminated on Type 110 insulation displacement connectors; printed circuit board interface.
   1. Jacks: Non-keyed RJ-45, suitable for and complying with same standard as cable to be terminated; maximum 48 ports per standard width panel.
   2. Capacity: Provide ports sufficient for cables to be terminated plus 25 percent spare plus mounting space for all active componenets/equipment required to cross-connect to tany/all modular jack ports on the patch panels.
   3. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA/EIA-606 using encoded identifiers.
   4. Provide incoming cable strain relief and routing guides on back of panel.
   5. Patch Cords: Provide one patch cord for each pair of patch panel ports.

C. Cable Management
   1. Equip each rack or cabinet with vertical cable section.
   2. Equip each rack or cabinet with horizontal cable managers above and below each patch section.
      a. 7 rings
      b. 6 pass-through holes
      c. Hinged front cover
   3. Use velcro cable wraps on all cable - tie wraps are not acceptable.

2.06 ENCLOSURES

A. Backboards: Interior grade plywood without voids, 3/4 inch thick; UL-labeled fire-retardant.
   1. Size: 48 inches wide by 96 inches high.
   2. Do not paint over UL label.
   3. Provide one 48" multi-outlet power strip with integral surge protection and outlets at 6" o.c. (minimum 7 outlets) mounted at center of terminal board.

B. Equipment Racks and Cabinets: CEA-310 standard 19 inch wide component racks.
   1. Wall Mounted Racks: 8 gage aluminum brackets, hinged to allow access to back of installed components.

C. Outlet Boxes: For flush mounting in walls; depth as required to accommodate cable manufacturer's recommended minimum conductor bend radius.
   1. Size, Unless Otherwise Indicated: 4 inches square by 2-1/8 inches deep.
   2. Faceplates: High impact thermoplastic, complying with system design standards and UL 514C.
   3. Labels: Comply with TIA/EIA-606 using encoded identifiers; label each jack on the face plate as to its function with a unique numerical identifier.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Comply with latest editions and addenda of TIA/EIA-568, TIA/EIA-569, ANSI/J-STD-607, NFPA 70, and SYSTEM DESIGN as specified in PART 2.

3.02 PATHWAYS

A. Underground Service Entrance: Install conduit at least 24 inches below finish grade; encase in at least 3 inches thick concrete for at least 60 inches out from the building line.

B. Install with the following minimum clearances:
   1. 48 inches from motors, generators, frequency converters, transformers, x-ray equipment, and uninterruptible power systems.
   2. 12 inches from power conduits and cables and panelboards.
   3. 5 inches from fluorescent and high frequency lighting fixtures.
   4. 6 inches from flues, hot water pipes, and steam pipes.

C. Conduit:
   1. Stub 3/4" conduit into accessible ceiling space from telephone/computer network outlet box.
   2. Install two UTP cables from each telephone/data outlet to terminal board unless indicated otherwise on Drawings. Route conductors in bundled, tied groups.
   3. Do not install more than 2 (two) 90 degree bends in a single horizontal cable run.
   4. Install insulated bushings on all stubbed conduit ends.
   5. Leave pull cords in place where cables are not initially installed.
   6. Conceal conduit under floor slabs and within finished walls, ceilings, and floors except where specifically indicated to be exposed.
      a. Conduit may remain exposed to view in mechanical rooms, electrical rooms, and telecommunications rooms.
      b. Treat conduit in crawl spaces and under floor slabs as if exposed to view.
      c. Where exposed to view, install parallel with or at right angles to ceilings, walls, and structural members.
      d. Under floor slabs, locate conduit at 12 inches, minimum, below vapor retarder; seal penetrations of vapor retarder around conduit.

D. Grounding and Bonding: Perform in accordance with ANSI/J-STD-607 and NFPA 70.

3.03 INSTALLATION OF EQUIPMENT AND CABLING

A. Cabling:
   1. Terminate cables at each outlet with specified modular jack assembly.
   2. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
   3. Do not over-cinch or crush cables.
   4. Do not exceed manufacturer's recommended cable pull tension.
   5. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.

B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
   1. At Distribution Frames: 120 inches.
   2. At Outlets - Copper: 12 inches.

C. Copper Cabling:
   1. Category 5e/6: Maintain cable geometry; do not untwist more than 1/2 inch from point of termination.

2. For 4-pair cables in conduit, do not exceed 25 pounds pull tension.
3. Copper Cabling Not in Conduit: Use only type CMP plenum-rated cable as specified.

D. Wall-Mounted Racks and Enclosures:
1. Install to plywood backboards only, unless otherwise indicated.
2. Mount so height of topmost panel does not exceed 78 inches above floor.

E. Field-Installed Labels: Comply with TIA/EIA-606 using encoded identifiers.
1. Cables: Install color coded labels on both ends.
2. Outlets: Label each jack on its face plate as to its type and function, with a unique numerical identifier.
3. Patch Panels: Label each jack as to its type and function, with a unique numerical identifier.
4. Patch Cords: Label with jack identifier corresponding to initial installation.

3.04 TESTING

A. Comply with inspection and testing requirements of specified installation standards.

B. Visual Inspection:
1. Inspect cable jackets for certification markings.
2. Inspect cable terminations for color coded labels of proper type.
3. Inspect outlet plates and patch panels for complete labels.
4. Inspect patch cords for complete labels.

C. Testing - Copper Cabling and Associated Equipment:
1. Test operation of shorting bars in connection blocks.
2. Category 5e/6 Links: Perform tests for wire map, length, attenuation, NEXT, and propagation delay.

D. Final Testing: After all work is complete, including installation of telecommunications outlets, and telephone dial tone service is active, test each voice jack for dial tone.

END OF SECTION

SECTION 28 3100

FIRE DETECTION AND ALARM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire alarm system design and installation, including all components, wiring, and conduit.

1.02 SYSTEM DESCRIPTION

A. The fire alarm system shall comply with requirements of NFPA Standard No. 72 for protected premises signaling systems except as modified and supplemented by this specification. The system shall be electrically supervised and monitor the integrity of all conductors.

B. The system shall be an active/interrogative type system where each device is repetitively scanned, causing a signal to be transmitted to the main fire alarm control panel (FACP) indicating that the associated initiating device and notification appliance circuit wiring is functional. Loss of such a signal at the main FACP shall result in a trouble indication as specified hereinafter for the particular input.

C. Operation of manual station or automatic activation of any smoke detector or heat detector shall -
   1. Cause system evacuation horns to sound and lamps to flash.
   2. The LCD display shall indicate all information associated with the Fire Alarm condition, including the type of alarm point and its location within the protected premises.
   3. All system output programs assigned via control by event equations to be activated by the particular point in alarm shall be executed, and the associated System Outputs (alarm indicating appliances and/or relays) shall be activated.
   4. Initiate off-site alarm notification.
   5. Initiate shut down of mechanical units with air flow in excess of 2000cfm.

1.03 REFERENCES

A. NFPA 70 - National Electrical Code; 2008.

B. NFPA 72 - National Fire Alarm Code; 2007.

C. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures; 2006.

D. UL 1635 - Digital Alarm Communicator System Units

E. UL 864 - Control Units for Fire Protective Signaling Systems.

F. UL 268 - Smoke Detectors for Fire Protective Signaling Systems.

G. UL 38 - Manually Actuated Signaling Boxes for Use with Fire-Protective Signaling Systems

H. UL 346 - Waterflow Indicators for Fire Protective Signaling Systems.

1.04 SUBMITTALS

A. See General Conditions - Administrative Requirements, for submittal procedures.

B. Evidence of designer qualifications.

C. Design Documents: Submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams, and description of operation:
   1. Copy (if any) of list of data required by authority having jurisdiction.
   2. NFPA 72 "Record of Completion", filled out to the extent known at the time.

3. Clear and concise description of operation, with input/output matrix similar to that shown in NFPA 72 Appendix A-7-5-2.2(9), and complete listing of software required.
4. System zone boundaries and interfaces to fire safety systems.
5. Location of all components, circuits, and raceways; mark components with identifiers used in control unit programming.
6. Circuit layouts; number, size, and type of raceways and conductors; conduit fill calculations; spare capacity calculations; notification appliance circuit voltage drop calculations.
7. List of all devices on each signaling line circuit, with spare capacity indicated.
8. Manufacturer's detailed data sheet for each component, including wiring diagrams, installation instructions, and circuit length limitations.
9. Description of power supplies; if secondary power is by battery include calculations demonstrating adequate battery power.
10. Certification by either the manufacturer of the control unit or by the manufacturer of each other component that the components are compatible with the control unit.
11. Certification by the manufacturer of the control unit that the system design complies with the contract documents.
12. Certification by Contractor that the system design complies with the contract documents.

D. Evidence of installer qualifications.

E. Evidence of instructor qualifications; training lesson plan outline.

F. Evidence of maintenance contractor qualifications, if different from installer.

G. Inspection and Test Reports:
1. Submit inspection and test plan prior to closeout demonstration.
2. Submit documentation of satisfactory inspections and tests.
3. Submit NFPA 72 "Inspection and Test Form," filled out.

H. Operating and Maintenance Data: Revise and resubmit until acceptable; have one set available during closeout demonstration:
1. Complete set of specified design documents, as approved by authority having jurisdiction.
2. Additional printed set of project record documents and closeout documents, bound or filed in same manuals.
3. Contact information for firm that will be providing contract maintenance and trouble call-back service.
4. List of recommended spare parts, tools, and instruments for testing.
5. Replacement parts list with current prices, and source of supply.
6. Detailed troubleshooting guide and large scale input/output matrix.
7. Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to Owner.
8. Detailed but easy to read explanation of procedures to be taken by non-technical administrative personnel in the event of system trouble, when routine testing is being conducted, for fire drills, and when entering into contracts for remodeling.

I. Project Record Documents: Have one set available during closeout demonstration:
1. Complete set of floor plans showing actual installed locations of components, conduit, and zones.
2. "As installed" wiring and schematic diagrams, with final terminal identifications.
3. "As programmed" operating sequences, including control events by device, updated input/output chart, and voice messages by event.

J. Closeout Documents:
1. Certification by manufacturer that the system has been installed in compliance with his installation requirements, is complete, and is in satisfactory operating condition.

2. NFPA 72 "Record of Completion", filled out completely and signed by installer and authorized representative of authority having jurisdiction.

1.05 QUALITY ASSURANCE

A. Designer Qualifications: NICET Level III or IV (3 or 4) certified fire alarm technician or registered fire protection engineer, employed by fire alarm control panel manufacturer, Contractor, or installer, with experience designing fire alarm systems in the jurisdictional area of the authorities having jurisdiction.

B. Installer Qualifications: Firm with minimum 3 years documented experience installing fire alarm systems of the specified type and providing contract maintenance service as a regular part of their business.
   1. Authorized representative of control unit manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.
   2. Installer Personnel: At least 2 years of experience installing fire alarm systems.
   3. Supervisor: NICET level III or IV (3 or 4) certified fire alarm technician; furnish name and address.

C. Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.

D. Instructor Qualifications: Experienced in technical instruction, understanding fire alarm theory, and able to provide the required training; trained by fire alarm control unit manufacturer.

1.06 EXTRA MATERIALS AND TOOLS

A. Provide spare parts of same manufacturer and model as those installed; deliver in original packaging, labeled in same manner as in operating and maintenance data.

B. In addition to the items in quantities indicated in PART 2, provide the following:
   1. All tools, software, and documentation necessary to modify the fire alarm system using Owner's personnel; minimum modification capability to include addition and deletion of devices, circuits, and zones, and changes to system description, operation, and evacuation and instructional messages.
   2. CD-ROM copies, 2, of all software not resident in read-only-memory.

1.07 WARRANTY

A. Provide control panel manufacturer's warranty that system components other than wire and conduit are free from defects and will remain so for 1 year after date of Substantial Completion.

B. Provide installer's warranty that the installation is free from defects and will remain so for 1 year after date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Alarm Control Units: Products of the following are acceptable:
   1. Honeywell Security & Fire Solutions/Gamewell Company
   2. Honeywell Security & Fire Solutions/Fire Control Instruments, Inc
   3. Honeywell Security & Fire Solutions/Fire-Lite
   4. Honeywell Security & Fire Solutions/Notifier
   5. Honeywell Security & Fire Solutions/Silent Knight
   6. SimplexGrinnell
   7. GE Security Vigilant
   8. Radionics

9. Mircom
10. Bosch
11. Provide all control units made by the same manufacturer.

B. Substitutions: See Section 01 6000 - Product Requirements.
   1. For other acceptable manufacturers of control units specified, submit product data showing equivalent features and compliance with contract documents.

2.02 FIRE ALARM SYSTEM

A. Equipment provided by SUU, installed by contractor

B. Circuits:
   1. Initiating Device Circuits (IDC): Class A, Style D.
   2. Notification Appliance Circuits (NAC): Class A, Style Z.

2.03 COMPONENTS

A. General:
   1. Provide flush mounted units where installed in finish areas; in unfinished areas, surface mounted unit are acceptable.
   2. Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.

B. Master Control Unit:
   1. Provided by SUU, installed by contractor

C. Initiating Devices:
   1. Provided by SUU, installed by contractor

D. Notification Appliances:
   1. Provided by SUU, installed by contractor

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and the contract documents.

B. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.

C. Label pull and junction boxes "FIRE ALARM" with red indelible ink.

D. Loop wires through each device on zone for proper supervision. Tee-taps not permitted.

E. Provide dust protection for installed smoke detectors until finish work is completed and building is ready for occupancy.

F. Protect conductors from cuts, abrasion and other damage during construction.

G. Minimum conductor size shall be 14 AWG unless otherwise specified.

H. Do not install ceiling mounted detectors within 3 feet of air discharge grills. Coordinate with other trades as required.

I. Post copy of wire identification list inside fire alarm panel door or other area accessible to fire alarm service personnel.

J. Provide duct smoke detectors for all mechanical units with air flow in excess of 2000 cfm and tie into fire alarm control panel. Provide fan shut down circuit and associated control equipment for all required mechanical units.

K. Obtain Owner's approval of locations of devices, before installation.

L. Install instruction cards and labels.

3.02 INSPECTION AND TESTING FOR COMPLETION

A. Notify Owner 7 days prior to beginning completion inspections and tests.

B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.

C. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.

D. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.

E. Provide all tools, software, and supplies required to accomplish inspection and testing.

F. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.

G. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

3.03 CLOSEOUT

A. Closeout Demonstration: Demonstrate proper operation of all functions to Owner.
   1. Be prepared to conduct any of the required tests.
   2. Have at least one copy of operation and maintenance data, preliminary copy of project record drawings, input/output matrix, and operator instruction chart(s) available during demonstration.
   3. Have authorized technical representative of control unit manufacturer present during demonstration.
   4. Demonstration may be combined with inspection and testing required by authority having jurisdiction; notify authority having jurisdiction in time to schedule demonstration.
   5. Repeat demonstration until successful.

END OF SECTION