PROJECT SPECIFICATIONS
FOR:
Light Fleet Maintenance Building
Project No. PW14B005BLD

County of Jefferson, Missouri
P.O. BOX 100
HILLSBORO, MO 63050
March 31, 2015

REQUEST FOR BID

BID OF

Bidder Name:_____

Bidder Address:_____

APPROVED FOR CONSTRUCTION

BY: _____ **DATE:** 2/19/15
(County Engineer)

STATE OF MISSOURI
JASON JONAS
PE-2005000998
2/19/15
PROFESSIONAL ENGINEER

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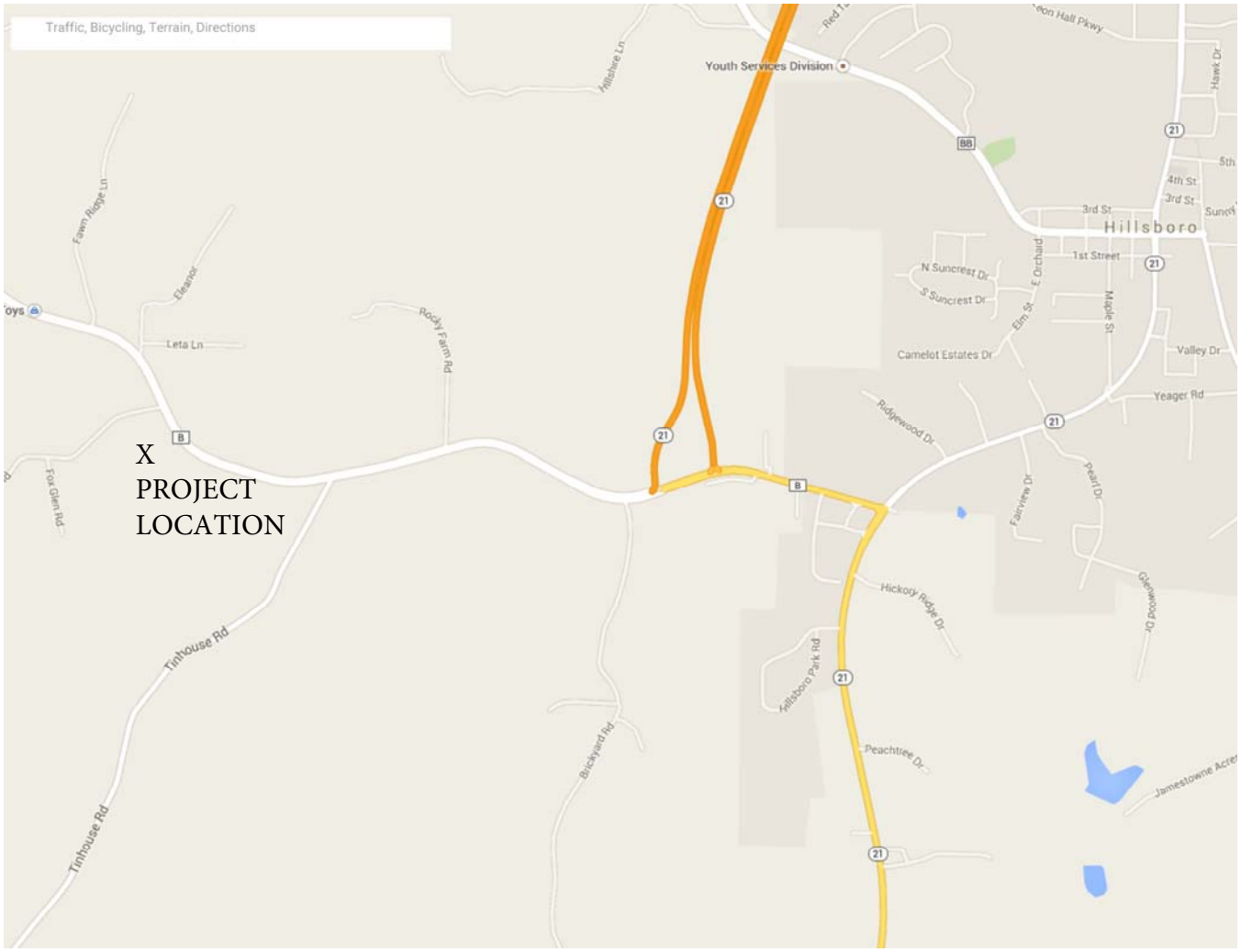
Google Maps


Traffic, Bicycling, Terrain, Directions
Youth Services Division
Hillsboro
Leta Ln
Rocky Farm Rd
Tinhouse Rd
Tinhouse Rd
Fox Glen Rd
Brickyard Rd
Hillsboro Park Rd
Hickory Ridge Dr
Peachtree Dr
Ridgewood Dr
Camelot Estates Dr
Yeager Rd
Valley Dr
1st Street
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N Suncrest Dr
S Suncrest Dr
Maple St
Fairview Dr
Pearl Dr
X
PROJECT
LOCATION
Map data ©2015 Google
1000 ft

BID NOTICE

Sealed bids for the Light Fleet Maintenance Building, Project No. PW14B005BLD, will be received at the office of The Department of the County Clerk, Jefferson County Administration Center, 729 Maple Street, Hillsboro, Missouri until 2:00 o'clock P.M. (CDST) on the 31st day of March, 2015, and at that time will be publicly opened and read. All bids shall be submitted in triplicate in an opaque sealed envelope, marked with the Project title, name and address of the Bidder, and accompanied by the other required documents. Bids submitted via fax or electronic will be rejected. Late Bids will not be accepted and will be returned to the sender, unopened.

The proposed work includes the construction of a single story slab on grade, pre-engineered steel building; with all steel siding and roof; with associated electrical/telecommunications, HVAC, plumbing, site and utility improvements. The contractor will be responsible for providing the materials and labor necessary to complete the project in a timely manner in accordance with these Specifications and Job Special Provisions. The contractor shall be responsible for arranging delivery of materials to job sites. The bid shall also include disposal of all waste and demolition materials.

Work shall be in accordance with these Specifications, and Job Special Provisions. Where not specifically covered by these Specifications or Job Special Provisions, the Contractor shall adhere to the Latest Edition of the, Jefferson County Building Code.

Specifications for this work will be available, at no cost, as a downloadable file from the Jefferson County website (http://www.jeffcomo.org/PublicWorksProjects.aspx?nodeID=Purchasing), beginning March 9. 2015. The bidder will be responsible to check the County's website for addendum(s) regarding this project prior to bid opening. All potential bidders **must complete the "Plan Holder Contact Information" form** and submit this form to Public Works at pwprojects@jeffcomo.org and request placement on the bidder's list in order to be considered for award.

All labor used in the construction of this public improvement shall be paid a wage no less than the prevailing hourly rate of wages of work of a similar character in this locality as established by the State of Missouri's "Annual Wage Order" that is currently effective 10 calendar days prior to bid opening.

The County of Jefferson, Missouri hereby notifies all bidders that it will affirmatively ensure that in any contract entered into pursuant to this advertisement, businesses owned and controlled by socially and economically disadvantaged individuals will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, religion, creed, sex, age, ancestry, or national origin in consideration for an award.

All bids shall be made on the forms provided. The County of Jefferson hereby reserves the right to reject any or all bids, to waive any informality in the bids received and to accept the bid that in its judgment will be for the best interest of Jefferson County, Missouri.

Contractors and sub-contractors who sign a contract to work on public works projects must provide a 10-Hour OSHA construction safety program, or similar program approved by the Department of Labor and Industrial Relations, to be completed by their on-site employees within sixty (60) days of beginning work on the construction project.

Each bid must be accompanied by a certified check or satisfactory bid bond payable to Jefferson County, Missouri, in the amount of five percent (5%) of the total amount of bid as a guarantee that the successful bidder will enter into a contract and furnish the required bonds within fifteen (15) days after the award is made.

END BID NOTICE

BIDDER CHECKLIST

<u>FINAL CHECKLIST BEFORE SUBMITTING BID</u>

☐ 1. The Technical Specifications/Job Special Provisions are for the bidder's information only and is not to be returned with the bid.

☐ 2. If submitting the bid by mail, it is to be completed, executed, and submitted in a sealed envelope addressed to County of Jefferson, Missouri. **<u>Provide the vendor name, vendor address, vendor number, county, route and federal project number on the outside of the envelope (if applicable)</u>**.

☐ 3. Please read all items in the bidding document carefully. For paper bids, complete all items in **ink** or by **typing** in the information.

☐ 4. Sign this bidding document properly. If submitted in the name of a firm or corporation, the legal name of the firm or corporation should appear in the space designated, and be signed for by one or more persons legally qualified to execute papers in the name of said firm or corporation. Affix Corporate Seal if the Bidder is a Corporation.

☐ 5. For paper bids submit the provided bid bond executed by bidder and surety, or attach cashier's check to the bid bond form.

☐ 6. For paper bids, staple addenda (if applicable) to the bid in the appropriate part of the bid. The letter accompanying the addenda should be stapled to the inside of the back cover of the bid and returned. The bidder should retain a duplicate copy.

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Below is a list of common mistakes made by bidders leading to non-responsive bids. Please refer to the Standard Specifications for the appropriate procedures for completing and submitting a bid.

a) Not signing the bid
b) Not incorporating the addendum into the bidding documents, including attaching the letter to the bid
c) Using a different bid bond form than the one provided
d) Using pencil to fill out the bid
e) Using white out to make corrections to the itemized bid sheets
f) Not initialing changes made

♦♦♦

All questions concerning the bid document preparation can be directed to the Jefferson County Public Works Department at 636-797-5340. Project specific questions can be directed to Jason Jonas at 636-797-5369 or jjonas@jeffcomo.org

<u>Special Needs:</u> If you have special needs addressed by the Americans with Disabilities Act, please notify Jefferson County Public Works Department, at 636-797-5340 or through Missouri Relay System, TDD 1-800-735-2966, at least five (5) working days prior to the bid opening.

INSTRUCTIONS TO BIDDERS

1. DEFINED TERMS

1.1 Terms used in these Instructions to Bidders, which are defined in the General Conditions of this Construction Contract, that have the meanings assigned to them in the General Conditions. The term "Successful Bidder" means the lowest, qualified, responsible Bidder to whom the County (on the basis of the County evaluation as hereinafter provided) makes an award.

2. COPIES OF BIDDING DOCUMENTS

2.1 Complete sets of the Bidding Documents may be obtained from the County Engineer.

2.2 Complete sets of the Bidding Documents shall be used in preparing Bids; The County does not assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

2.3 The County in making copies of Bidding Documents available on the above terms does so only for the purpose of obtaining Bids on the Work and do not confer a license or grant for any other use.

3. QUALIFICATIONS OF BIDDERS

3.1 To demonstrate qualifications to perform the Work, each Bidder must submit **with the bid** written evidence of previous experience and evidence of authority to conduct business in the jurisdiction where the Project is located. Each Bid must contain evidence of Bidder's qualification to do business in the state where the Project is located or covenant to obtain such qualification prior to award of the contract.

4. EXAMINATION OF CONTRACT DOCUMENTS AND SITE

4.1 Before submitting a Bid, each Bidder must (a) examine the Contract Documents thoroughly, (b) visit the site to familiarize himself with local conditions that may in any manner affect cost, progress or performance of the Work, (c) familiarize himself with federal, state and local laws, ordinances, rules and regulations that may in any manner affect cost, progress or performance of the Work; and (d) study and carefully correlate Bidder's observations with the Contract Documents.

4.2 Before submitting his Bid each Bidder will, at his own expense, make such investigations and tests as the Bidder may deem necessary to determine his Bid for performance of the Work in accordance with the time, price and other terms and conditions of the Contract Documents.

4.3 On request, the County will provide each Bidder access to the site to conduct such investigations and tests, as each Bidder deems necessary for submission of his Bid.

4.4 The lands upon which the Work is to be performed rights – of - way for access thereto and other lands designated for use by the Contractor in performing the work are identified in the General Conditions, General Requirements, Special Provisions or Drawings.

5. INTERPRETATIONS

5.1 All questions about the meaning or intent of the Contract Documents shall be submitted to the County Engineer. Replies will be issued by Addenda mailed or electronically delivered to all parties recorded by the County Engineer as having received the Bidding Documents. Oral and other interpretations or clarifications will be without legal effect.

6. CONTRACT TIME

6.1 The number of days within which, or the date by which, the Work is to be completed and the Bid price is to remain in effect is set forth in the Bid Form and will be included in the Agreement.

7. SUBSTITUTE MATERIALS AND EQUIPMENT

7.1 The Contract, if awarded, will be on the basis of material and equipment described in the Drawings or specified in the Specifications without consideration of possible substitute or "or-equal" items. Whenever it is indicated in the Drawings or specified in the Specifications that a substitute or "or-equal" item of material or equipment may be furnished or used by Contractor if acceptable to the County Engineer, application for such acceptance will not be considered by County Engineer until after the "effective date of the Agreement".

8. SUBCONTRACTORS, ETC.

8.1 No subcontract may be awarded by Contractor under this Contract to anyone without approval of the County. In order for such approval to be obtained the Contractor shall **submit with the bid** the **Name and Address** of the proposed subcontractor for verification. The proposed subcontractor must also submit, through the Contractor, the following documents in an acceptable form:

1. Copy of any subcontracts;
2. Certification by proposed subcontractor regarding equal employment opportunity;
3. Certification by proposed subcontractor concerning labor standards and prevailing wage requirements;
4. Any such other documents and evidence as the County may reasonably request to show that the subcontractor has fully complied with any reporting requirements to which it is or was subject.
5. Affidavit of Federal Employment Authorization to be completed and turned in by proposed subcontractors

6. Subcontractor shall have certificate of insurance with the same limits as the prime contractor listing Jefferson County Public Works as Additional Insured and as a certified holder. The endorsement is also required.
7. E-verify MOU in its entirety.

The documents by proposed subcontractors are not required to be attached to the Contractor's Bid.

9. BID FORM

9.1 The Bid Form is attached hereto; additional copies may be obtained from the County Engineer.

9.2 Bid Forms must be completed in ink or by typewriter or computer. The Bidder shall indicate, in figures, a unit price for each item on the form for each sub category. In case of discrepancy between the gross sum shown on the bid and that obtained by adding the products of the quantities of work and the unit prices, the bidder agrees that the unit prices shall govern, and any errors found in said products and gross sum may be corrected by the County.

9.3 Bids by corporations must be executed in the corporate name by the president or a vice-president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal must be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature.

9.4 Bids by partnerships must be executed in the partnership name and signed by a partner, whose title must appear under the signature and the official address of the partnership must be shown below the signature.

9.5 All names must be typed or printed below the signature.

9.6 The Bid shall contain an acknowledgment of receipt of all Addenda (the numbers of which shall be filled in on the Bid Form).

9.7 The address to which communications regarding the Bid are to be directed must be shown.

10. BID SECURITY

10.1 Bid Security shall be made payable to the Owner, in the amount of five percent of the Bidder's maximum Bid price and in the form of a certified or bank check or a Bid Bond (on form attached, if a form is prescribed) issued by a Surety.

10.2 The Bid security of the Successful Bidder will be retained until such Bidder has executed the Agreement and furnished the required Contract Security within 15 days of the Notice of Award. Failure to do so may result in the annulment of the Notice of Award and forfeiture of the Bid Security. The Bid Security of any Bidder whom the Owner believes to have a reasonable chance of receiving the award may be retained by the Owner until the earlier of the seventh day after the "effective date of the Agreement" (which is the date

when the agreement has been executed by all parties) by Owner to Contractor and the required Contract Security is furnished or the sixty-first day after the Bid opening. Bid Security of other Bidders will be returned within seven days of the Bid opening.

11. SUBMISSION OF BIDS

11.1 **Bids shall be submitted, in triplicate**, at time and place indicated in the Invitation to Bid and shall be included in an opaque sealed envelope, marked with the Project title and name and address of the Bidder and accompanied by the other required documents. If the Bid is sent through the mail or other delivery system the sealed envelope shall be enclosed in a separate envelope with the notation "BID ENCLOSED" on the face thereof.

12. MODIFICATION AND WITHDRAWAL OF BIDS

12.1 Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.

12.2 If, within twenty-four hours after Bids are opened, any Bidder files a duly signed written notice with the County and promptly thereafter demonstrates to the reasonable satisfaction of the County that there was a material and substantial mistake in the preparation of his Bid, that Bidder may withdraw his bid. Thereafter, that Bidder will be disqualified from further bidding on the Work.

13. OPENING OF BIDS

13.1 Bids will be opened publicly.

13.2 When Bids are opened publicly they will read aloud, and an abstract of the amounts of the base Bids and major alternates (if any) will be made available after the opening of Bids.

14. BIDS TO REMAIN OPEN

14.1 All Bids shall remain open for sixty days after the day of the Bid opening, but the County may at their sole discretion, release any Bid and return the Bid Security prior to that date.

15. BID SUBMITTAL REQUIREMENTS

15.1 Failure to submit the following required documents prior to the bid opening will make the bid non-responsive and not eligible for award consideration:

- Notice to Contractors
- Certification Regarding Anti-collusion
- Certification Regarding Use of Contract Funds for Lobbying
- Certification Regarding Debarment and Suspension
- Certification Regarding Affirmative Action and Equal Opportunity
- Bid Guaranty
- Acknowledgement of Addenda, if applicable

- Bid to be submitted in ink with proper signatures with no white out or initialed changes
- Balanced Bid
- Delinquent Taxes Affidavit or Proof of Payment
- Certificate of Insurance

16. AWARD OF CONTRACT

16.1 The County reserves the right to reject any and all bids, to waive any and all informalities, and the right to reject non-responsive bids with County Council concurrence.

16.2 In evaluating Bids, the County shall consider whether the Bid meets all requirements of the advertisement and proposal, and any alternates and all unit prices requested in the Bid forms are provided.

16.3 The County may consider the qualifications and experience of Subcontractors and other persons and organizations (including those who are to furnish the principal items of material or equipment) proposed for those portions of the work as to which the identity of Subcontractors and other persons and organizations must be submitted as provided. Operating costs, maintenance considerations, performance data and guarantees of materials and equipment may also be considered by the County.

16.4 The County may conduct such investigations as they deem necessary to assist in the evaluation of whether any Bid is responsive in accordance with the Contract Documents to the County's satisfaction within the prescribed time.

16.5 If the contract is to be awarded, the County will give the Successful Bidder a Notice of Award within sixty days after the date of the Bid opening.

17. LIQUIDATED DAMAGES

17.1 Provisions for liquidated damages, if any, are set forth in the agreement.

18. PERFORMANCE AND OTHER BONDS

18.1 Section 32 of the General Conditions set forth the County’s requirements as to performance and other Bonds. When the Successful Bidder delivers the executed Agreement to the County it shall be accompanied by the required Contract Security.

19. SIGNING OF AGREEMENT

19.1 When the County gives a Notice of Award to the Successful Bidder, it will be accompanied by at least four unsigned counterparts of the Agreement and all other Contract Documents. Within fifteen days thereafter Contractor shall sign and deliver at least four counterparts of the Agreement to the County with all other Contract Documents attached. The County will return one executed Contract Agreement to the Contractor.

20. FAILURE TO EXECUTE AGREEMENT

20.1 Failure to execute the agreement and to file the acceptable contract bonds within 15 days after the unexecuted agreement has been mailed to the bidder shall be just cause for the cancellation of the award and the forfeiture of the bid guaranty. A bidder failing to file an acceptable bid or contract bond from an approved surety or failing to execute the agreement within the time provided, resulting in a cancellation of the award to that bidder, disqualifies that bidder, and any other firm having common ownership or control with that bidder, from performing any work on the County project or projects which are the subject of that bid, as a prime contractor, a subcontractor or a supplier.

END OF INSTRUCTIONS TO BIDDERS

NOTICE TO CONTRACTORS

Sealed bids for the proposed work will be addressed and delivered to the office of The County Clerk, 729 Maple Street, Jefferson County Administration Center, Hillsboro, Missouri until 2:00 o'clock P.M. (CDST) on **March 31, 2015**, and at that time will be publicly opened. All bids shall be submitted in triplicate in an opaque sealed envelope, marked with the Project title, name and address of the Bidder, and accompanied by the other required documents. Bids submitted via fax or electronic will be rejected. Late Bids will not be accepted and will be returned to the sender, unopened.

(1) **PROPOSED WORK:** The proposed work, hereinafter called the work, includes the construction of a single story slab on grade, pre-engineered steel building; with all steel siding and roof; with associated electrical/telecommunications, HVAC, plumbing, site and utility improvements. The contractor will be responsible for providing the materials and labor necessary to complete the project in a timely manner in accordance with these Specifications and Job Special Provisions. The contractor shall be responsible for arranging delivery of materials to job sites. The bid shall also include disposal of all waste and demolition materials.

(2) **COMPLIANCE WITH CONTRACT PROVISIONS**: The bidder, having examined and being familiar with the local conditions affecting the work, and with the contract, contract documents and the request for bid, including appendices, the special provisions and plans, hereby proposes to furnish all labor, materials, equipment, services, etc., required for the performance and completion of the work.

(3) **PERIOD OF PERFORMANCE**: If the bid is accepted, the bidder agrees that work shall be diligently prosecuted at such rate and in such manner as, in the judgment of the engineer, is necessary for the completion of the work within the time specified as follows in accordance with Sec 108:

Working Days: **90**

(4) **LIQUIDATED DAMAGES**: The bidder agrees that, should the bidder fail to complete the work in the time specified or such additional time as may be allowed by the engineer under the contract, the amount of liquidated damages to be recovered in accordance with Sec 108 shall be as follows:

Liquidated damages per day: **$ 950**

(5) **BID GUARANTY**: The bidder shall submit a Bid Guaranty. The project bid bond form is included in the bid book. The bidder shall mark the box below to identify the type of Bid Guaranty.

☐ Paper Bid Bond
☐ Cashier's Check

(6) **CERTIFICATIONS**: By signing and submitting this bid, the bidder makes the certifications appearing in Sec. 102.18.1 of the 2011 Missouri Standard Specifications for Highway Construction (regarding affirmative action and equal opportunity), Sec. 102.18.2 (regarding disbarment, eligibility, indictments, convictions, or civil judgments), Sec. 102.18.3 (regarding anti-collusion), and Sec. 102.18.4 (regarding lobbying activities). Any necessary documentation is to accompany the bid submission, as required by these sections. As provided in Sec. 108.13, the contracting authority may terminate the contract for acts of misconduct, which includes but is not limited to fraud, dishonesty, and material misrepresentation or omission of fact within the bid submission.

(7) **TAXES:** No bid or proposal shall be awarded by Jefferson County unless the prospective Bidder provides proof that the Bidder does not owe delinquent real or personal property taxes to Jefferson County. The prospective Bidder is required to provide proof in the form of an original paid tax receipt issued by the Jefferson County Collector or a verified affidavit stating that the applicant does not own any real or personal property in Jefferson County. Tax receipts for the past 3 years are required and may be obtained at http://jeffersonmo.devnetwedge.com/ or a notarized affidavit stating that the applicant does not own any real or personal property in Jefferson County on company letterhead.
Section 135.040 of the Jefferson County Code of Ordinances (Ord. No. 10-0411) requires that no bid or proposal shall be awarded by Jefferson County unless the prospective Bidder provides proof that the Bidder does not owe delinquent real or personal property, or that the Bidder does not own any real or personal property in Jefferson County. All

delinquent real or personal property taxes shall be paid, in-full, prior to the award of any bid, or proof shall be provided that the Bidder does not own any real or personal property in Jefferson County prior to the award of any bid. Jefferson County considers that the failure to pay any and all real or personal property taxes due Jefferson County, Missouri, the failure to report all real or personal property owned, held or used in Jefferson County, the failure to provide proof thereof, and/or the failure to keep said tax bills current shall be deemed a material breach of the contract and will subject the contract to immediate cancellation. All taxes, due and owing, must be paid in full at the time the bid is awarded by Jefferson County and remain paid during the entire term of the contract unless the prospective Bidder provides proof that the Bidder does not own real or personal property in Jefferson County. This requirement shall not apply to the award of bids for projects which are funded in whole or in part by Federal funds.

(8) **MISSOURI DOMESTIC PRODUCT PROCUREMENT ACT:** Bidder represents that the goods provided comply with Sections 34.350 to 34.359, RSMo, known as the Domestic Product Procurement Act. The Act encourages the purchase of products manufactured or produced in the United States, State of Missouri, and Jefferson County, Missouri. Bidder shall include proof of compliance with the Act with the bid when requested.

(9) **ANTIDISCRIMINATION**: The Contracting Authority hereby notifies all bidders that it will affirmatively insure that in any contract entered into pursuant to this advertisement, businesses owned and controlled by socially and economically disadvantaged individuals will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, religion, creed, sex, age, ancestry, or national origin in consideration for an award.

(10) **PREVAILING WAGE (STATE ONLY)**: This contract requires payment of the prevailing hourly rate of wages for each craft or type of worker required to execute the contract as determined by the Missouri Department of Labor and Industrial Relations. The applicable State Wage Rates for this contract are detailed in the "Annual Wage Order" that is effective 10 calendar days prior to bid opening. These supplemental bidding documents have important legal consequences. It shall be conclusively presumed that they are in the bidder's possession, and they have been reviewed and used by the bidder in the preparation of any bid submitted on this project.

(11) **WORKER ELIGIBILITY REQUIREMENTS:** Execution of the construction contract for this project is dependent upon the awarded bidder providing an Affidavit of Compliance AND E-Verify Memorandum-of-Understanding (MOU) between the bidder and Department of Homeland Security to the Contracting Authority as required by section 285.530 RSMo**. The cover page and signature page of the E-Verify MOU and the Affidavit must be submitted with the bid.**

A sample Affidavit of Compliance can be found at the Missouri Attorney General's website at the following link:

http://ago.mo.gov/forms/Affidavit_of_Compliance.pdf

All bidders must also be enrolled in the E-Verify Program, and include their MOU prior to contract execution. Bidders who are not enrolled will need to go to the following website link and select "Enroll in the Program" to get started. After completing the program, they will receive their E-Verify MOU with Department of Homeland Security. This document will need to be printed out and kept on file so that a copy can be attached to the Affidavit of Compliance.

http://www.dhs.gov/files/programs/gc_1185221678150.shtm

This requirement also applies to subcontractors and contract labor, but this contract only requires submittal of the verification documents for the prime contractor. It is the prime contractor's responsibility to verify the worker eligibility of their subcontractors in order to protect their own company from liability as required by section 285.530 RSMo.

(12) **OSHA TEN HOUR TRAINING REQUIREMENTS:** Missouri Law, 292.675 RSMO, requires any awarded contractor and its subcontractor(s) to provide a ten-hour Occupational Safety and Health Administration (OSHA) Construction Safety Program (or a similar program approved by the Missouri Department of Labor and Industrial Relations as a qualified substitute) for their on-site employees (laborers, workmen, drivers, equipment operators, and craftsmen) who have not previously completed such a program and are directly engaged in actual construction of the improvement (or working at a nearby or adjacent facility used for construction of the improvement). The awarded contractor and its subcontractor(s) shall require all such employees to complete this ten-hour program, pursuant to 292.675 RSMO, unless they hold documentation on their prior completion of said program. Penalties, for Non-Compliance include contractor forfeiture to the Contracting Authority in the amount of $2,500, plus $100 per contractor and subcontractor employee for each calendar day such employee is employed beyond the elapsed time period for required program completion under 292.675 RSMO.

(13) **ADDENDUM ACKNOWLEDGEMENT**: The undersigned states that all addenda (if applicable) have been received, acknowledged and incorporated into their bid, prior to submittal. For paper bids, staple addenda to the bid in the appropriate part of the bid.

(14) **SIGNATURE AND IDENTITY OF BIDDER**: The undersigned states that the following provided information is correct and that (if not signing with the intention to bind themselves to become the responsible and sole bidder) they are the agent of, and they are signing and executing this, as the bid of

_____, which is the correct LEGAL NAME as stated on the contractor questionnaire (if applicable).

a) The organization submitting this bid is a(n) (1) individual bidder, (2) partnership, (3) joint venturer (whether individuals or corporations, and whether doing business under a fictitious name), or (4) corporation. Indicate by marking the appropriate box below.

☐ sole individual ☐ partnership ☐ joint venture

☐ corporation, incorporated under laws of state of _____.

b) If the bidder is doing business under a fictitious name, indicate below by filling in the fictitious name
_____

Executed by bidder this _____ day of _____ 20___.

THE BIDDER CERTIFIES THAT THE BIDDER AND ITS OFFICIALS, AGENTS, AND EMPLOYEES HAVE NEITHER DIRECTLY NOR INDIRECTLY ENTERED INTO ANY AGREEMENT, PARTICIPATED IN ANY COLLUSION, OR OTHERWISE TAKEN ANY ACTION IN RESTRAINT OF FREE COMPETITIVE BIDDING IN CONNECTION WITH THIS BID, AND THAT THE BIDDER INTENDS TO PERFORM THE WORK WITH ITS OWN BONAFIDE EMPLOYEES AND SUBCONTRACTORS, AND DID NOT BID FOR THE BENEFIT OF ANOTHER CONTRACTOR.

THE BIDDER ACKNOWLEDGES THAT THIS IS AN UNSWORN DECLARATION, EXECUTED UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE UNITED STATES AND/OR FALSE DECLARATION UNDER THE LAWS OF MISSOURI, AND ANY OTHER APPLICABLE STATE OR FEDERAL LAWS. THE FAILURE TO PROVIDE THIS CERTIFICATION IN THIS BID MAY MAKE THIS BID NON-RESPONSIVE, AND CAUSE IT TO BE REJECTED.

THE BIDDER CERTIFIES THAT THE BIDDER'S COMPANY KNOWINGLY EMPLOYS ONLY INDIVIDUALS WHO ARE AUTHORIZED TO WORK IN THE UNITED STATES IN ACCORDANCE WITH APPLICABLE FEDERAL AND STATE LAWS AND ALL PROVISIONS OF MISSOURI EXECUTIVE ORDER NO. 07-13 FOR CONTRACTS WITH THE CONTRACTING AUTHORITY.

☐ Check this box ONLY if the bidder REFUSES to make any or all of these certifications. The bidder may provide an explanation for the refusal(s) with this submittal.

_____
Signature of Bidder's Owner, Officer, Partner or Authorized Agent

_____
Please print or type name and title of person signing here

Attest:

_____
Secretary of Corporation if Bidder is a Corporation

Affix Corporate Seal (If Bidder is a Corporation)

NOTE: If bidder is doing business under a fictitious name, the bid shall be executed in the legal name of the individual, partners, joint ventures, or corporation, and registration of fictitious name filed with the secretary of state, as required by sections 417.200 to 417.230 RSMo. If the bidder is a corporation not organized under the laws of Missouri, it shall procure a certificate of authority to do business in Missouri, as required by section 351.572 et seq RSMo. A certified copy of such registration of fictitious name or certificate of authority to do business in Missouri shall be filed with the

Missouri Highways and Transportation Commission, as required by the standard specifications.

(15) SUBCONTRACTOR DISCLOSURE: Requirements contained within Sec 102.7.12 of the Missouri Standard Specification for Highway Construction shall be waived for this contract.

(16) PROJECT AWARD: This project will be awarded to the lowest, most capable bidder for each road sub category. The total of the unit costs does not represent a comparative number. Estimated final quantities will be used as multipliers to predict final cost. For the purpose of bid comparison, estimated final quantities will remain constant for all bidders regardless of varying product weights. Award will be determined by lowest final estimated cost, and may also include factors for bidder responsiveness, contractor capability, and performance abilities.

(17) PRIME CONTRACTOR REQUIREMENTS: The limitation in Sec 108.1.1 of the Missouri Standard Specifications for Highway Construction that "the contractor's organization shall perform work amounting to not less than 40 percent of the total contract cost" is waived for this contract. Instead, the less restrictive terms of the Federal Highway Administration's rule at Title 23 Code of Federal Regulations (CFR) § 635.116(a) shall apply, so that the contractor must perform project work with its own organization equal to and not less than 30 percent of the total original contract price. Second-tier subcontracting will not be permitted on this contract. All other provisions in Sec 108.1.1 et seq. of the Missouri Standard Specifications for Highway Construction shall remain in full force and effect, and shall continue to govern the contractor and its subcontractors, in accordance with the provisions of Title 23 CFR § 635.116.

(18) SALES AND USE TAX EXEMPTION: County of Jefferson, a tax exempt entity, will furnish a Missouri Project Exemption Certificate as described in Section 144.062 RSMo to the awarded contractor who in turn may use the certificate to purchase materials for a specific project performed for the tax exempt entity. Only the materials and supplies incorporated or consumed during the construction of the project are exempt. The certificate will be issued to the contractor for a specific project for a defined period of time.

ITEMIZED BID: The bidder should complete the following section in accordance with Sec 102.7. The bidder proposes to furnish all labor, materials, equipment, services, etc. required for the performance and completion of the work, as follows:

(Next Page)

BID FORM

TO: JEFFERSON COUNTY, MISSOURI
BID FOR: LIGHT FLEET MAINTENANCE BUILDING
PROJECT NO. PW14B005BLD

1. The undersigned BIDDER proposes and agrees, if this BID is accepted, to enter into an Agreement with the County in the form included in the Contract Documents to complete all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with the Contract Documents.

2. BIDDER accepts all of the terms and conditions of the Instructions to Bidders. This Bid will remain open for sixty days after the day of Bid opening. BIDDER will sign the Agreement and submit all documents required within fifteen (15) days after the COUNTY'S Notice of Award.

3. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:

(a) BIDDER has examined the site and locality where the Work is to be performed, the legal requirements (federal, state and local laws, ordinances, rules and regulations) and the conditions affecting cost, progress or performance of the Work and has made such independent investigations as BIDDER deems necessary; and

(b) This Bid is genuine and not made in the interest of or on behalf on any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; BIDDER has not solicited or induced any person, firm or a corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for himself any advantage over any other Bidder or over the County.

4. Bidder will complete project for the following unit prices. It is understood that the quantities given for the following bid items are not guaranteed by the Jefferson County Public Works Department and are used solely for the purpose of comparing bids and awarding the contract, and may or may not represent the actual quantities encountered on the job: and that the sum of quantities listed below, multiplied by the unit price shall constitute the gross sum bid.

Light Fleet Maintenance Building – PW14B005BLD

This is a Lump Sum Bid

Total Cost **$_____**

NOTICE TO BIDDER - Bidders must complete the above section in its entirety.

5. BIDDER agrees that the work will be completed within the working days assigned for each roadway or the CONTRACTOR shall pay the COUNTY, not as a penalty but as **liquidated damages**, a sum equal to Nine Hundred – Fifty Dollars **($950.00)** for each working or calendar day (excluding Saturdays, Sundays and Legal Holidays) elapsing between the expiration of such time limit plus such extensions as may be necessary to cover contingencies beyond the CONTRACTOR'S control and the date of the full completion.

The County reserves the right to negotiate additional terms for the time of completion with the successful bidder.

6. Communications concerning this Bid shall be addressed to the following:

Address: _____

_____

7. The terms used in this Bid which are defined in the General Conditions of the Construction Contract included as part of the Contract Documents have the meanings assigned to them in the General Conditions.

8. **CERTIFICATIONS FOR FEDERAL JOBS**: By signing and submitting this bid, the bidder makes the certifications appearing in Sec. 102.18.1 of the 2011 Missouri Standard Specifications for Highway Construction (regarding affirmative action and equal opportunity), Sec. 102.18.2 (regarding disbarment, eligibility, indictments, convictions, or civil judgments), Sec. 102.18.3 (regarding anti-collusion), and Sec. 102.18.4 (regarding lobbying activities). Any necessary documentation is to accompany the bid submission, as required by these sections. As provided in Sec. 108.13, the contracting authority may terminate the contract for acts of misconduct, which includes but is not limited to fraud, dishonesty, and material misrepresentation or omission of fact within the bid submission.

9. BIDDER has examined copies of all the Contract Documents and of the following addenda:

Date:	Number:
_____	_____
_____	_____
_____	_____
_____	_____

(receipts of all of which is hereby acknowledged) and also copies of the Bid Notice and the Instructions to Bidders:

SUBMITTED on _____, 20____

By_____
(Corporation Name)

_____
(State of incorporation)

By_____
(Name of person authorized to sign) (Signature and typed)

_____
(Title)

(Corporate Seal)

Attest_____
(Secretary) (Signature and typed)

Business address:_____

_____

_____

Phone No.:_____

BID BOND

Suitable bid security in the amount of:

_____

($_____) Dollars and equal to five (5%) percent as called for in the advertisement for bids which accompanies this proposal. This sum is to be forfeited to the County of Jefferson if the party or parties making the proposal fail to enter into a contract with the approved securities within fifteen (15) days after the Notice of Award has been made. The undersigned has examined the Plans and Specifications for the work to be done and has satisfied himself as to the work to be done and the conditions under which it must be carried out.

The Contractor shall commence work within three (3) days after the date of a written Notice to Proceed from the County and shall fully complete all work under this proposal within the scheduled time established by the Contract Documents. This proposal shall be equally binding to all heirs, administrators, executors, successors and assigns.

FIRM NAME _____

BY _____

TITLE _____

ATTEST _____

TITLE _____

ADDRESS _____

_____

TELEPHONE _____

BIDDER'S ACKNOWLEDGMENT

(Complete and fill out all parts applicable, and strike out all parts not applicable)

STATE OF_____)
) SS.
COUNTY OF_____)

On this_____ day of _____ 20_____, before me appeared_____ to me personally known, who, being by me first duly sworn, did say that he executed the forgoing Proposal with full knowledge and understanding of all its terms and provisions and of the plans and specifications; that the correct legal name and address of the Bidder (including those of all partners or joint ventures) is fully and correctly set out above; that all statements made therein by or for the Bidder are true; and

(if a sole individual) acknowledged that he executed the same as his free act and deed.

(if a partnership or joint venture) acknowledged that he executed the same, with written authority from, and as the free act and deed of, all said partners or joint venturers.

(if a corporation) that he is the_____
(President or other agent)

of_____; that the above Proposal was signed and sealed in behalf of said corporation by authority of its board of directors; and he acknowledged said proposal to be the free act and deed of said corporation.

Witness my hand and seal at_____,_____
The day and year first above written.

(SEAL) _____
Notary Public

My commission expires_____20_____

ANNUAL WORKER ELIGIBILITY VERIFICATION AFFIDAVIT

(for joint ventures, a separate affidavit is required for each business entity)

STATE OF _____)
) ss
COUNTY OF _____)

On the _____ day of _____, 20____, before me appeared _____, personally known to me or proved to me on the basis of satisfactory evidence to be a person whose name is subscribed to this affidavit, who being by me duly sworn, stated as follows:

• I, the Affiant, am of sound mind, capable of making this affidavit, and personally certify the facts herein stated, as required by Section 285.530, RSMo, to enter into any contract agreement with the state to perform any job, task, employment, labor, personal services, or any other activity for which compensation is provided, expected, or due, including but not limited to all activities conducted by business entities.

• I, the Affiant, am the _____ of _____, and I am duly authorized, directed, and/or empowered to act officially and properly on behalf of this business entity.

• I, the Affiant, hereby affirm and warrant that the aforementioned business entity is enrolled in a federal work authorization program operated by the United States Department of Homeland Security, and the aforementioned business entity shall participate in said program to verify the employment eligibility of newly hired employees working in connection with any services contracted by the Jefferson County. I have attached documentation to this affidavit to evidence enrollment/participation by the aforementioned business entity in a federal work authorization program, as required by Section 285.530, RSMo.

• I, the Affiant, also hereby affirm and warrant that the aforementioned business entity does not and shall not knowingly employ, in connection with any services contracted by Jefferson County, any alien who does not have the legal right or authorization under federal law to work in the United States, as defined in 8 U.S.C. § 1324a(h)(3).

• I, the Affiant, am aware and recognize that, unless certain contract and affidavit conditions are satisfied pursuant to Section 285.530, RSMo, the aforementioned business entity may be held liable under Sections 285.525 though 285.550, RSMo, for subcontractors that knowingly employ or continue to employ any unauthorized alien to work within the state of Missouri.

• I, the Affiant, acknowledge that I am signing this affidavit as a free act and deed of the aforementioned business entity and not under duress.

_____
Affiant Signature

Subscribed and sworn to before me in _____, _____, the day and year first above-written.
city (or county) state

_____
Notary Public

My commission expires:

[documentation of enrollment/participation in a federal work authorization program attached]

AGREEMENT FORM

THIS AGREEMENT is dated as of _____, in the year ____ by and between JEFFERSON COUNTY, MISSOURI (hereinafter called OWNER OR COUNTY) and _____(hereinafter called CONTRACTOR).

OWNER and CONTRACTOR, in consideration of the mutual covenants herein after set forth and in the amount of _____, agree as follows:

ARTICLE 1. WORK

CONTRACTOR shall complete all work as specified or indicated in the Contract Documents for the **Light Fleet Maintenance Building, PW14B005BLD**. The work is generally described as follows:

The proposed work includes the construction of a single story slab on grade, pre-engineered steel building; with all steel siding and roof; with associated electrical/telecommunications, HVAC, plumbing, site and utility improvements. The contractor will be responsible for providing the materials and labor necessary to complete the project in a timely manner in accordance with these Specifications and Job Special Provisions. The contractor shall be responsible for arranging delivery of materials to job sites. The bid shall also include disposal of all waste and demolition materials.

ARTICLE 2. ENGINEER

The County has designated the Director of Public Works, who is hereinafter called ENGINEER and who has the authority assigned to OWNER in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

ARTICLE 3. CONTRACT TIME

3.1 The County will issue a notice to proceed for purchasing materials to the CONTRACTOR 20 days before the notice to proceed with the work on site. The Contractor will begin work on site and will continuously prosecute the work to the completion of the project. Allowance will be made for weather conditions and other occurrences beyond the control of the CONTRACTOR. **All work on the building site shall be completed in 90 working days.**

If the CONTRACTOR is unable to begin work as required, the ENGINEER shall be notified in writing. Unless the ENGINEER gives written approval for a delay in beginning the work, calendar days will begin to be counted for liquidated damages. The count will continue until the CONTRACTOR begins full operation. The count will resume when work is suspended, or full operation is not maintained.

3.2 Liquidated Damages. The Contractor agrees that should he fail to complete work in the time specified or such additional time as may be allowed by the Owner under this contract, the Contractor shall pay the County, not as a penalty but as **liquidated damages**, a sum equal to **Nine Hundred and Fifty Dollars ($950.00)** for each working day (excluding Saturdays, Sundays and Legal Holidays) elapsing between the expiration of such time limit plus such extensions as may be necessary to cover contingencies beyond the CONTRACTOR'S control and the date of the full completion.

ARTICLE 4. CONTRACT PRICE

4.1 Owner shall pay Contractor for performance of the work in accordance with the contract documents in current funds.

Light Fleet Maintenance Building – PW14B005BLD

This is a Lump Sum Bid

Total Cost **$_____**

NOTICE TO BIDDER - Bidders must complete the above section in its entirety.

5.0 Contractor shall submit Application for Payment in accordance with Paragraph 26 of the General Conditions. The Engineer as provided in the General Conditions will process application for Payment.

5.1 Progress Payment. Owner will make progress payments per the Contract Bid Price on the basis of the Contractor's Application of Payment as recommended by the Engineer, on or about the First day of each month during the construction as provided below. All progress payments will be on the basis of the Work measured on the job site according to unit of measurement as shown within the job special provisions or Missouri Standard Specifications.

5.1.1 The Owner may initiate withholding of retainage as provided by Section 109.9 of the Missouri Standard Specifications for Highway Construction. Release of any retained percentage shall be as provided by Section 109.9.

5.1.2 When the Contractor receives any payment from the Owner, the Contractor shall make prompt payment to subcontractors and suppliers as provided by Section 109.13 of the 2011 Missouri Standard Specifications for Highway Construction.

5.2 Final Payment. Upon final completion and acceptance of the Work in accordance with Paragraph 26 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by the ENGINEER.

ARTICLE 6. CONTRACTOR'S REPRESENTATIONS

In order to induce the County to enter into this Agreement CONTRACTOR makes the following representations:

6.1 CONTRACTOR has familiarized himself with the nature and extent of the Contract Documents, Work, locality, and with all local conditions and federal laws, state and local laws, ordinances, rules and regulations that in any manner may affect cost, progress or performance of the Work.

6.2 CONTRACTOR has studied carefully all reports of investigations and tests of subsurface and latent physical conditions at the site of otherwise affecting cost, progress or performance of the Work which were relied upon by the ENGINEER in the preparation of the Drawings and Specifications. When the information is available it will either be included in the bid documents or made available at the Jefferson County Public Works Department for the Contractor’s review.

6.3 CONTRACTOR has made or caused to be made examinations, investigations and tests and studies of such reports and related data in addition to those referred to in Article 9 as he deems necessary for the performance of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract documents; and no additional examinations, investigations, tests, reports or similar data will be required by CONTRACTOR for such purposes.

6.4 CONTRACTOR has correlated the results of all such observations, examinations, investigations, tests, reports and data with the terms and conditions of the Contract Documents.

6.5 CONTRACTOR has given ENGINEER written notice of all conflicts, errors or discrepancies that he has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.

ARTICLE 7. CONTRACT DOCUMENTS

The Contract Documents which comprise the entire agreement between OWNER and CONTRACTOR are attached to this Agreement, made a part hereof and consists of the following:

7.1 This Agreement

7.2 Exhibits to this Agreement (if any)

7.3 Contract Performance and Payment and Materials Bonds, consisting of 3 pages.

7.4 Notice of Award

7.5 General Conditions (page 1 to 18, inclusive).

7.6 Specifications bearing the title PROJECT SPECIFICATIONS FOR Light Fleet Maintenance Building PW14B005BLD and consisting of all pages as listed in the table of contents thereof.

7.7 Addenda numbers ___ to ___ , inclusive.

7.8 CONTRACTOR'S Bid and all attachments

7.9 Documentation submitted by CONTRACTOR prior to Notice of Award

7.10 Any Modification, including Change Orders, duly delivered after execution of agreement.

There are no Contract Documents other than those listed above in this Article 7. The Contract Documents may only be altered, amended or repealed by a Modification (as defined in Article 28 of the General Conditions).

ARTICLE 8. MISCELLANEOUS

8.1 Terms used in this Agreement which are defined in Article 1 of the General Conditions shall have the meanings indicated in the General Conditions.

8.2 No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

8.3 The County and CONTRACTOR each binds himself, his partners, successors, assigns and legal representatives to the other party hereto, his partners, successors, assigns and

legal representatives in respect to all covenants, agreements and obligations contained in the Contract Documents.

ARTICLE 9. OTHER PROVISIONS

9.1 Access to records. In connection with this Contract the County shall have access to any books, documents, papers, and records of the CONTRACTOR, which are directly pertinent to this project for the purpose of making an audit, examination, excerpts, and transcriptions.

9.2 Applicable Laws and Regulations. The CONTRACTOR expressly agrees to comply with all applicable rules and regulations as set forth in the Contract Documents or as may be required by law, and further agrees to submit all certifications, notices, and affirmative action plans as may now or hereafter be required, and to place such conditions and provisions in any and all subcontracts as may be required.

9.3 Conflict of Interest. The CONTRACTOR covenants that he or she presently has not interest of any kind and shall not acquire any type of interest, direct or indirect, in the program or any property therein, which would conflict in any manner or degree with the performance of his or her services and obligation hereunder. The CONTRACTOR further covenants that in the performance of this contract, no person known to have any conflicting interest shall be knowingly employed in the performance of this Contract.

ARTICLE 10. VENUE

10.1 It is agreed by the parties that any action at law, suit in equity, or other judicial proceeding to enforce or construe this Agreement, or regarding its alleged breach, shall be instituted only in the Circuit Court of Jefferson County, Missouri.

IN WITNESS WHEREOF, the parties hereto have signed this agreement in quadruplicate. All portions of the Contract Documents have been signed or identified by OWNER and CONTRACTOR or by ENGINEER on their behalf.

FOR: JEFFERSON COUNTY, MISSOURI

BY:_____ Date: _____
COUNTY EXECUTIVE

ATTEST: _____ _____
COUNTY CLERK DEPUTY CLERK

FOR:_____

BY: _____ Date: _____
CONTRACTOR

ATTEST: _____

I hereby certify under section 50.660 RSMo there is either: (1) a balance of funds, otherwise unencumbered, to the credit of the appropriation to which the obligation contained herein is chargeable, and a cash balance otherwise unencumbered, in the treasury, to the credit of the funds from which payment is to be made, each sufficient to meet the obligation contained herein; or (2) bonds or taxes have been authorized by vote of the people and there is a sufficient unencumbered amount of the bonds yet to be sold or of the taxes levied and yet to be collected to meet the obligation in case there is not a sufficient unencumbered cash balance in the treasury.

_____
COUNTY AUDITOR

APPROVED AS TO FORM

_____
COUNTY COUNSELOR

CONTRACT PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the Undersigned _____

_____ of _____
(firm)

*a (corporation) duly authorized by law to do business as a construction contractor in the
(partnership)

State of_____(hereinafter called the “Contractor”), and_____

_____(hereinafter called the "Surety"), a corporation duly authorized to do a Surety business under the laws of the State of Missouri, are held firmly bound unto Jefferson County, (hereinafter called the "County"), in the penal sum of _____ Dollars ($_____), lawful money of the United States, for the payment of which to be made unto said County, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents as follows:

The conditions of this obligation are such that, whereas on the ____ day of _____, 20___, the said Principal entered into a written Agreement, which Agreement is hereby made a part hereof, with the said County for the construction of _____.

NOW THEREFORE, if the said Principal shall faithfully and properly perform the foregoing Contract according to all the terms thereof, and shall, as soon as the work contemplated by said contract is completed, pay to the proper parties all amounts due for all labor and material required by this contract in the construction work, and all insurance premiums for both compensation and all other kinds of insurance on said work, and for all labor performed in such work whether by subcontractor or otherwise, then this obligation shall be void, otherwise it shall remain in full force and effect, and may be sued on for the

use and benefit by any person furnishing material or performing labor, either as an individual or as a subcontractor, for any contractor in the name of said County.

Every Surety on this bond shall be deemed held, any contract on the contrary notwithstanding, to consent without notice.

a) To the extension of time to the Contractor in which to perform the contract.

b) To changes in the plans, specifications, amount of work or contract.

IN TESTIMONY WHEREOF, the Parties hereunto have caused the execution hereof in _____ original counterparts as of the _____ day of _____, 20____.

_____

(SEAL)

Attest:

_____ By _____

_____

(SEAL)

Attest:

_____By _____

PAYMENT AND MATERIALS BOND

KNOW ALL MEN BY THESE PRESENT, that we,_____
Principal and Address

_____, as Principal, and_____,
Surety and Address

as Surety, are held and firmly bond unto The County of Jefferson, Missouri, hereinafter called Obligee, in the amount of $_____, for the payment of which we jointly and severally bind ourselves, our heirs, executors, administrators, successors, trustees, and assigns firmly by these presents.

WHEREAS, the Principal has entered into a contract with Obligee for

_____; and
describe briefly

WHEREAS, the Obligee requires that the Principal enter into a surety bond satisfying the terms of Section 107.170 R.S.Mo.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such, that if the Principal shall pay, or cause to be paid in full, the claims of all persons performing labor upon, or furnishing materials to be used in, or furnishing appliances, equipment or power contributing to such work under said contract, then this obligation shall be void; otherwise to remain in full force and effect. The total amount of surety's liability under this bond shall in no event exceed the amount hereof, and in no event shall the undertaking hereby be construed to impose liability on the surety beyond that required by the terms of Section 107.170 R.S.Mo.

Signed and sealed this _____ day of _____, 20___.

PRINCIPAL

By _____

SURETY

By _____

(ACKNOWLEDGMENT FOR PRINCIPAL)
(ACKNOWLEDGMENT AND POWER OF ATTORNEY FOR SURETY)

GENERAL CONDITIONS

1. DEFINITIONS:

The following terms as used in these Contract Documents are respectively defined as follows:

a)	"Owner"	A person, firm, corporation, municipality or Government agency, by which the Contract will be awarded. Where ever the Owner is specified, it shall also be construed to mean his authorized representative.
b)	"Consultant"	The Engineering firm responsible for the preparation of construction plans.
c)	"Contractor"	The person, firm, or corporation to whom the contract is awarded.
d)	"Subcontractor"	A person, firm, or corporation, performing any part of the Contractor's obligations hereunder at the site of work excluding, however, the furnishing of standard materials, such as cement, lumber, and other materials not worked to a special design under the plans and specifications for the work.
e)	"Contract Documents"	The agreement subscribed by the parties, the Invitation to Bidders, Information for Bidders, the Proposal, and the Plans and Specifications.
f)	"Work"	The furnishing of all labor, materials, equipment and other incidentals necessary or convenient to the successful completion and carrying out of all duties and obligations of the Contractor under the Contract Documents.
g)	"Days"	Except where otherwise specifically provided in the Contract Documents, calendar days including Sundays and Holidays.

2. NOTICE:

Unless otherwise specified herein, any notice required under the Contract Documents shall be deemed given if deposited in the United States mail, first class postage prepaid.

Notice may also be given by hand delivery to the authorized representative.

3. INTENT OF THE CONTRACT DOCUMENTS:

The intention of the Contract Documents is to include in the contract price the cost of all labor and materials, water, fuel, tools, plant, equipment, light, transportation and all other expense as may be necessary for the proper execution of the work.

In interpreting the Contract Documents, words describing materials of work which have a well-known technical or trade meaning, unless otherwise specifically defined in the Contract Documents, shall be construed in accordance with such well-known meaning recognized by architects, engineers and the trade.

The work shall be executed in strict conformity with the plans and specifications.

The Contract Documents are complimentary and what is called for by any one shall be as binding as if called for by all. Anything stated in the specifications and not shown in the drawings, or shown in the drawings and not stated in the specifications, shall be of like effect as if shown or stated in both.

4. PLANS:

Unless otherwise provided in the Contract Documents, the Owner will furnish the Contractor free of charge, one full size set of reproducible prints, one full size set of printed plans, one half size set of printed plans and one set of unbound specifications. The Contractor will be responsible for reproducing the plans necessary to carry out all the work. In addition to the prints and printed plans and specifications noted above, the Contractor may have all remaining sets of plan used for bidding purposes excluding those for use by County personnel.

In case of discrepancy in the plans, the matter shall be immediately submitted to the Consultant or Owner without whose decision said discrepancy shall not be adjusted by the Contractor, save only at his own risk and expense.

5. SUPERVISION AND PERSONNEL:

The Contractor shall have at the work site at all times a job supervisor. That individual shall be capable of reading and understanding the project plans and specifications, have authority to order materials and equipment, and have authority to execute work as directed by the Owner. The Contractor shall provide the name and phone numbers of the person appointed as job supervisor prior to issuance of notice to proceed.

All workers shall have sufficient skill and experience to properly perform the work assigned to them. The owner may demand the dismissal of any person employed by the contractor in, about or upon the work who engages in misconduct, is incompetent or negligent in the due and proper

performance of assigned duties, or who neglects or refuses to comply with any proper directions given. Such person shall not again be employed thereon without the written consent of the owner. Should the contractor continue to employ or re-employ any such person, the owner may suspend the work until the contractor complies with such orders.

6. COMPLIANCE WITH LAWS:

The Contractor shall comply with all laws, ordinances, rules and regulations bearing in the conduct of the work and shall obtain at his expense all permits and licenses necessary for the prosecution of the work.

The Contractor shall be responsible for the payment of all Federal, State, municipal or local taxes, including but not limited to sales and use taxes, applicable to the performance of the contract and shall indemnify and hold harmless the Owner from the consequences of his failure to pay such taxes.

A sales tax exemption for construction materials is allowed by RSMo Section 144.062 RSMo, which applies to contractors for the County. Jefferson County will issue an exemption certificate to the contractors, subcontractors and suppliers for the purchase of materials used in construction.

7. USE OF JOB SITE:

The Contractor shall confine his equipment, apparatus, the storage of materials and operations of his workmen to limits indicated by law, ordinance, permits, easements or plans and shall not encumber the premises with his materials.

The Contractor shall not load or permit any part of any structure to be loaded to the extent that its safety may be endangered.

8. SANITARY PROVISIONS:

The Contractor shall provide and maintain in a neat, sanitary condition such accommodations for the use of his employees as may be necessary to comply with the sanitary requirements of law or ordinance.

9. SURVEYS:

The Contractor shall provide all surveys necessary to the performance of his work. All work shall be done to the lines, grades and elevations shown on the plans. Any work done without being properly located may be ordered removed and replaced at the Contractor's expense.

The Owner or Consultant may, in his sole discretion, check from time to time the reference marks, lines, grades and measurements established by the Contractor but his exercise or failure to exercise such right shall not relieve the Contractor of his obligation under the preceding paragraph.

10. CONDITIONS AT THE SITE:

The Contractor shall make such investigations of conditions above or below the surface of the ground, as he may deem necessary for the proper and timely performance of his work, including but not limited to the making of borings. No oral representations by any persons respecting such conditions shall in any manner be binding upon the Owner or the Consultant.

The Owner may have, for its own use, made borings at or near the site of the work. The boring data, if collected, will be made available to the Contractor, for his own convenience, if he desires to examine it.

Any interpretations or conclusions drawn by the Contractor from such data shall be his own and the Owner makes no representation or guaranty concerning the accuracy or completeness of such data.

11. UTILITIES AND OTHER OBSTRUCTIONS:

It shall be the sole responsibility of the Contractor in the performance of the contract to locate and avoid all utilities, other structures and obstructions whether located below or above the surface of the ground. For that purpose he shall employ all necessary precautions and methods to prevent damage to utilities, other structures and obstructions. In the event such damage does occur, the Contractor shall be solely liable therefore and he shall notify the affected utility and Owner immediately, make or have made all necessary repairs and bear the expense thereof and all damage caused thereby.

If the Contractor finds he cannot safely work at a location designated in the plans and specifications, either because of utilities, other structures or obstructions that may be damaged, he shall notify the Owner immediately.

Certain information relating to piping and underground utilities and structures, such as gas mains, water mains, and electric duct lines, has been gathered by the Consultant for its purposes and has been shown on the plans for the convenience of the Contractor and for such use as he may, at his own risk, desire to make of it. Any interpretations or conclusions drawn by the Contractor from such data on the plans shall be his own and the Owner and the Consultant makes no representations or guaranty concerning the accuracy or completeness of such data.

12. STRUCTURES ENCOUNTERED AND PROTECTION OF LIFE AND PROPERTY:

The Contractor shall, at his own expense, support and protect all buildings, bridges, conduits, wires, water pipes, sewers, pavements, curbing, sidewalks, equipment and fixtures of all kinds and all other public or private property that may be encountered or endangered in the execution of the work herein contemplated. He shall replace, repair or to otherwise make good any damage caused to any such property to the satisfaction of the Owner thereof.

In the event the Contractor does not perform his obligations under the preceding paragraph, the Owner reserves the right at its election to make good any damage to public or private property caused by the work of the Contractor and the cost thereof shall be borne by the Contractor.

In the event the Contractor refuses or fails to pay bills therefore upon presentation, the Owner may pursue any remedies available to it or may deduct the amount thereof from any money that may be due the Contractor hereunder from time to time.

Throughout the performance of the work, the Contractor shall construct and adequately maintain suitable and safe crossings over the trenches, and such detours as are necessary to care for the public and private traffic. The material excavated from trenches shall be deposited in such manner as shall give as little inconvenience as possible to the traveling public, to adjoining property owners, to other contractors or to the Owner.

The Contractor at his own expense shall provide the necessary watchmen and sufficient warning lights and barricades and take such other precautions as are necessary to protect life and property.

The Contractor shall provide watchmen or additional watchmen at any point where they may be requested by the proper official of any municipality or governmental body affected.

Nothing in this section shall be construed as requiring the Contractor to provide a road patrol.

13. PROTECTION OF WORK:

The Contractor shall provide proper facilities, take all necessary precautions and assume the entire cost for protecting the work against adverse weather conditions and for handling all storm and flood water, sewage, seepage, ice or snow that may be encountered during the performance of the contract and the manner for providing for such contingencies and for carrying on the work in freezing weather shall meet with the approval of the Owner. If the Contractor shall fail to provide such protection or in the event of emergencies, the Owner may provide such protection at the Contractor's expense.

The contractor assumes all risk of damage to or destruction of the work covered by this contract until the work is completed and accepted by the Owner and shall repair or replace at his expense any work damaged or destroyed prior to such completion and acceptance regardless of cause.

14. ACCIDENT PREVENTION:

Precaution shall be exercised at all times for the protection of persons (including employees) and property. The safety provisions of applicable laws and building and construction codes shall be observed.

15. BLASTING:

The Contractor shall comply with all Federal, State, County and municipal laws, rules and regulations applicable to the transportation, storage or use of explosives.

The Contractor shall assume all responsibility for any injury or damage that may be done during the transportation, storage or use of any explosives.

16. OTHER CONTRACTS:

The Owner may award other contracts for additional work, and the Contractor shall fully cooperate with such other contractors, and carefully schedule and fit his own work to that work provided under the other contract. The Contractor shall not commit or permit any act, which will interfere with the performance of work by any other contractor.

17. CUTTING AND PATCHING:

The Contractor shall do all cutting, fitting, or patching of his work that may be required to make its several parts connect with the work of other contractors shown upon, or reasonably implied by the plans and specifications.

The Contractor shall not endanger any work by cutting, digging, or otherwise, and shall not cut or alter the work of any other contractor.

18. CLEANING UP:

The Contractor shall at all times keep the premises free from accumulation of waste material of rubbish and at the completion of the work shall remove from and about the site all his rubbish, tools, equipment, scaffolding and surplus materials and shall leave his work clean and ready for use.

19. SURVEILLANCE:

The Contractor shall provide safe, sufficient and proper facilities at all times for the surveillance of work by the Consultant, the Owner, the Missouri Department of Transportation, the Federal Highway Administration, or any other governmental agency, it being agreed that these agencies have the right of entry.

The Contractor shall within 24 hours after receiving written notice from the Owner proceed to remove all materials rejected by the Owner, whether worked or unworked, and take down all portions of the work, which shall be considered as unsound or improper, or in any way failing to conform to the plans and specifications.

Should it be considered necessary or advisable by the Owner at any time before acceptance of the entire work to make an examination of work already completed by removing or tearing out same, the Contractor shall, on written request, promptly furnish all necessary facilities, labor, and material for that purpose. If such work is found to be defective or nonconforming in any material respect, due to the fault of the Contractor or his subcontractors, he shall defray all the expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the contract, an equitable adjustment shall be made in the contract price to compensate the Contractor for the additional services involved in such examination and reconstruction and, if completion of the work has been delayed thereby, he shall, in addition, be granted a suitable extension of time.

Unless otherwise provided in this contract, acceptance by the Owner shall be made as promptly as practicable after completion of all work required by this contract. Acceptance shall be final and conclusive except as regards latent defects, fraud, or gross mistakes as may amount to

fraud, or as regards the Owner's rights under any warranty or guarantee.

20. MATERIALS AND WORKMANSHIP:

Unless otherwise stipulated in the specifications, all workmanship, equipment, materials and articles incorporated in the work covered by this contract are to be new and of the best grade of their respective kinds for the purpose. When required by the plans and specifications, the Contractor shall furnish the Owner or Consultant, for approval, certified copies of test results made of the materials or articles, which he contemplates incorporating in the work. Samples of materials shall be submitted for approval when so directed. Machinery, equipment, materials and articles installed or used without such approval shall be at the risk of subsequent rejection.

If not otherwise provided, material or work called for in this contract shall be furnished and performed in accordance with established practice and standards recognized by architects, engineers and the trade.

21. "OR EQUAL CLAUSE":

Whenever, in these specifications or in any of the Contract Documents, any article, appliance, device or material is designated by a manufacturer's or vendor's or proprietary or trade name and such words are not followed by the condition "or equal", it shall be deemed that the words "or equal" do follow such designation unless the text clearly requires a contrary interpretation. Any article or material equaling the standards fixed may be used in place of that specifically mentioned by the specifications, provided that the material proposed is first submitted to and approved by the Owner or Consultant.

If by reason of the unavailability of material or equipment, a substitute item of material or equipment is approved by the Owner or Consultant, the Owner shall receive the benefit of any economy resulting from the substitution.

22. SCHEDULE AND PROGRESS REPORTS:

The Contractor shall, within 15 calendar days after date of notice to proceed, submit to the Owner five copies of a diagram covering operations in the work for the County's review and approval subject to update. The diagram will be used as a basis for review of monthly progress reports until the project is completed. At the request of the Owner, the diagram may be updated to demonstrate actual progress.

23. TIME OF COMPLETION AND LIQUIDATED DAMAGES:

The parties recognize that time is of the essence of this contract and, after the Contractor receives notice to proceed from the Owner, the work to be performed hereunder shall be commenced and shall be completed within the respective number of days specified in the proposal.

If the Contractor fails to complete the work within the time specified, or any extension thereof granted hereunder, the Contractor should pay the Owner the sum specified in the Contract for each calendar day (excluding Saturdays, Sundays, and Legal Holidays) the Contractor is in default. It is agreed that said daily sum is to be paid, not as a penalty, but as compensation to the Owner as liquidated damages for loss which the Owner will suffer because of such default

through increased administrative and engineering costs and other tangible and intangible costs. Such damages may be at the Owner's option, be deducted from any monies held by it which are payable to the Contractor.

The completion of the work included under this Contract is defined for purposes of determining liquidated damages, as that time when all of the structures and appurtenances have been completed and tested and are, in the opinion of the Owner, ready for continuous permanent use and occupancy for the purposes intended, which includes all grading, cleaning up, or other minor work which is required to provide a completed project in accordance with the plans and specifications. The date shall be the date of a letter from the Owner to the Contractor indicating substantial completion or final acceptance.

24. EXTENSION OF TIME:

The Contractor shall not be entitled to any extension of time for completion of the work as herein above specified unless the Contractor, within 10 days from the beginning of any delay, notifies the Owner in writing of such delay and the cause thereof and the Owner shall determine:

a. That such delay arises from unforeseeable causes beyond the control and without the fault on negligence of the Contractor, including but not restricted to, acts of God, acts of public enemy, acts of Government in either its sovereign or contractual capacity, acts of another contractor in the performance of a contract with the Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, unusually severe weather, or delays of subcontractors arising from such unforeseeable causes beyond the control and without the fault or negligence of both the Contractor and such subcontractors; and

b. That the Contractor cannot complete the work within the time specified solely by reason of such causes.

The Owner shall make a determination as soon as practicable after the Contractor's notice is received and shall decide the amount of additional time, if any, for completion of the work which conditions justify. Any time extensions will require approval of the Missouri Highway and Transportation Department and the Federal Highway Administration, as well as the Owner.

25. FORFEITURE OF CONTRACT:

Should the Contractor at any time refuse, neglect or fail to supply a sufficient number of properly skilled workmen or sufficient equipment or materials of the proper quality, or execute the work with diligence and in accordance with approved schedules, or fail in the performance of any of the covenants herein contained, the Owner may, after three days written notice to the Contractor and his bonding company, provide any such labor, equipment or materials and deduct the cost thereof from any money then due or thereafter to become due to the Contractor under this contract.

Alternatively, the Owner, may after ten days written notice to the Contractor and his bonding company, terminate the employment of the Contractor for said works and enter upon the premises and take possession of all materials, tools and equipment thereon and finish or contract with others to finish the work. The Owner and such others may use such materials, tools and equipment to finish the work. The Contractor shall not be entitled to rental or other compensation for the use of his construction tools and equipment, but shall only be entitled to the return thereof

in the condition existing when possession was taken, ordinary wear and tear excepted. In case of such discontinuance of the employment of the Contractor, the Contractor shall not be entitled to receive any further payment under this Contract until the said work shall be wholly finished, at which time, if the unpaid balance of the amount to be paid under this contract shall exceed the expenses incurred by the Owner to the Contractor, but if such expenses shall exceed such unpaid balance, the Contractor shall pay the difference from money then due or thereafter to become due to the Contractor under this contact. The expense incurred by the Owner as here provided for finishing the work and its cost incurred through such default shall be certified by the Consultant, whose certificate thereof shall be conclusive and binding upon the parties. The remedies of the Owner under this Article are exclusive of and in addition to any other contained in this contract, the Contractor's bonds, or provided by law.

26. PAYMENTS:

The Contractor shall receive as full compensation for all work hereunder a sum equal to the value of the work done based in his proposal, attached hereto and made a part of this contract.

Payment shall be made to the Contractor monthly, based upon the approved pay request. The final payment shall be paid to the Contractor, subject to approval of the final change order, within 30 days after completion and acceptance of the entire work herein contracted for, and upon receipt by the County, and approval of, all final documentation. Final documentation shall include proof of the meeting of DBE goals, and the release by materials suppliers and subcontractors of having received full payment.

By the 15th of each month the Contractor shall submit to the Owner an invoice containing an estimate of the percentage of the total work under the contract accomplished to the end of such month. The invoice shall be in such form and detail as required by the Owner.

The requirements set forth in Section 109 of the Missouri Standard Specifications For Highway Construction for payments, retained percentage, release of retained percentage, prompt payment to subcontractors and suppliers and final payment shall apply to all contracts where the Federal Government is participating in the cost of construction.

27. PAYMENTS NO EVIDENCE OF PERFORMANCE:

No certificate for payment made under this contract except the final certificate of final payment, shall be evidence of the performance of this contract, either wholly or in part. No Payment shall be construed to be an acceptance of defective work or improper materials.

28. CHANGES:

The Owner and/or the Consultant shall have the right to make changes within the scope of the work or change the quantities of the work to be performed. No such change shall be valid unless made in writing by the Owner or Consultant, and for all Federal Aid Contracts such changes shall first be approved by both the Missouri Highway and Transportation Department and the Federal Highway Administration.

In the event such changes cause an increase or decrease in the Contractor's cost of or time required for performance of the contract, the contract price and/or period of performance shall be equitably adjusted; provided, the increase or decrease in the amount of the work for which unit

prices apply under the specifications shall be computed by multiplying the change in quantities (measured as provided in the contract documents) of such work by such contract prices.

In the absence of a bid price for a given item of work not provided for nor fairly included in the bid prices for other items of work, a written agreement may be made between the Owner and the Contractor to be included in the written order for such extra work.

Whenever the Contractor and the Owner are unable to agree on prices for extra work and the Owner directly or acting through the Consultant orders the Contractor to proceed with the work by force account, the work will be paid for in the manner herein described and the compensation thus provided shall constitute full payment for said work. Payment will be determined as follows:

For all materials purchased by the Contractor and used in the force account work, he will be paid the actual cost of such materials, including sales taxes if required, and freight and delivery charges as shown by original receipted bills, to which will be added an amount equal to 15 percent if the sum thereof. The Owner or Consultant, however, reserves the right to approve or to reject the materials to be used and the sources of supply of any materials furnished by the Contractor.

For all equipment and machinery used in the force account work, the Contractor will be paid reasonable operated and maintained rental prices to which no percentages will be added.

The Contractor will be paid the cost of wages for all labor while engaged in the force account plus the actual cost chargeable to the force account work of workmen's compensation insurance, social security taxes, unemployment compensation insurance and such additional amounts as are paid by the Contractor by reason of an employment contract generally applicable to his employees, to which total sum will be added an amount equal to 15 percent of wages and other costs listed above. In evidence of the costs of labor, equipment and materials for which payment is to be made under the force account order; the Contractor shall provide a certified statement of wages actually paid, together with copies of supporting payrolls, of equipment rental charges, and of bills for materials.

Wage rates used in determining the amount of the payment will be the actual wage rates paid by the Contractor for work under this contract, except that no rate used shall exceed the rate of comparable labor currently employed on the project.

Payment for services of foremen in direct charge of the specific operation will be made. Payment for the services of superintendents, timekeepers or other overhead personnel will not be made nor will payment for services of watchmen be made unless required specifically by the force account work. The actual function performed by an employee rather than his payroll title will be the criterion used in determining the eligibility of an employee's services for payment under this provision.

The types and amounts of equipment and machinery used by the Contractor in carrying out his work under the force account order shall be in keeping with normal practice for work of a similar nature, except that the Owner or Consultant may, at his discretion, limit by specific instruction the type and amounts of equipment and machinery to be used.

In computing the hourly rental of such equipment, less than 30 minutes shall be considered ½ hour, except when the minimum rental to be paid shall be one hour. Rental time will not be allowed while equipment is inoperative due to breakdowns. The rental time of equipment to be paid for shall the time the equipment is in operation on the force account work being performed, and, in addition, shall include the time required to move the equipment to the work and return it to

its original location. When approved in advance by the Owner or Consultant, towing or transporting costs will be allowed when the equipment is moved by means other than its own power. No payment will be made for moving time, towing or transporting the equipment if it is used at the site of the work on other than force account work. No payment will be allowed for the use of small tools and minor items of equipment, which, as used herein, are defined as individual tools or pieces of equipment having a replacement value of $50.00 each or less.

For additional premiums paid on Performance and Labor and Materials Bonds by reason of increases in the account of work over and above that called for in the original contract due to the inclusion of the force account work, and for additional premiums paid on Public Liability and Property Damage Insurance by reason of extra hazard inherent in the force account work of the type called for in the original contract, the Contractor will, on presentation of substantiating evidence from his bonding and insurance carriers, be paid the actual costs of the increase in premium , to which no percentages will be added. Payment for the cost of additional premiums paid on Workmen's Compensation Insurance by reason of extra hazard introduced into the Contractor's operations by the inclusion of force account work is covered by the provisions above, except that any claim for additional cost based on the application, by reason of extra hazard, of a higher insurance rate to any portion of the payroll over and above that chargeable to the force account work under the provisions above, must be substantiated by evidence from the Contractor's insurance carrier.

The Contractor and Owner shall compare records of the work performed on a force account basis at the end of each day. These records shall be prepared in triplicate by the Contractor and shall be signed by both the Owner and the Contractor's representative, one copy being retained by the Contractor and two copies retained by the Owner.

Payment for force account work will be included in monthly progress payments.

29. LIENS AND CLAIMS:

In addition to other remedies available the Owner hereunder, in all cases of non-payment by the Contractor or a subcontractor of any sums of money due for labor, materials, supplies, equipment or other items in performing in this contract, or if at any time there should be evidence of a lien or claim chargeable to the Contractor or a subcontractor for which, if established, the Owner might become liable, the Owner is hereby authorized and empowered to retain out of any payment then due or thereafter to become due to the Contractor, an amount sufficient to indemnify the Owner against any such lien or claim.

Alternatively, without limiting other remedies and rights of the Owner under the Contract, under the Contractor's bonds or under the law, the Owner may withhold, in addition to the 10 percent retention, a sufficient amount of payments otherwise due to the Contractor to cover payments that may be past due and payable by the Contractor or his subcontractors or suppliers for just claims for labor or materials furnished in and about the performance of the work under this contract and for failure of the Contractor to make proper payments to his subcontractors. The Owner shall disburse and shall have the right to act as agent for the Contractor in disbursing such funds as have been withheld pursuant to this paragraph to the party or parties who are entitled to payment there from. The Owner will render the Contractor a proper accounting of all such funds disbursed in behalf of the Contractor.

Final payment nor any part of the retained percentage shall become due until the Contractor shall deliver to the Owner a complete waiver or release by himself and his subcontractors and others of all liens and claims arising out of the work, or receipts in full lieu thereof, and if required, an

affidavit that so far as he has knowledge or information the releases and receipts include all the labor and materials for which a lien could be filed.

30. RESPONSIBILITY:

Nothing in the Contract Documents shall be construed as placing the work under the specific direction or supervision of the Owner or the Consultant or relieving the Contractor from his liability as an independent contractor and, as such, he shall perform his work, including, but not limited to, supervision and control of his own personnel and scheduling of the work as required to ensure its proper and timely performance, and he shall be solely responsible for the exercise of due care to prevent bodily injury and damage to property in the execution of the work.

The Owner or Consultant shall have the right of entry to the site for the purpose of verifying compliance with the plans and specifications.

31. INDEMNIFICATIONS AND INSURANCE:

Responsibility for Claims for Damage or Injury

The Contractor and surety shall indemnify and save harmless the County, and its members, agents and employees from all claims or suits made or brought for personal injury, death or property damage, caused or contributed to be caused by:

(a) The negligence of the contractor, subcontractors, suppliers or their respective officers, agents or employees;

(b) The creation or maintenance of a dangerous condition of or on the County's property or right of way, which condition occurred at least in part due to the acts or omissions of the contractor, subcontractors, suppliers or their respective officers, agents or employees; or

(c) The failure of the contractor, subcontractors, suppliers of their respective officers, agents or employees, to perform the work in accordance with the plans and specifications.

Neither the County nor the Contractor, by execution of a contract, shall intend to or create a new or enlarge an existing cause of action in any third party. This provision shall not be interpreted to create any new liability which does not exist under the statutory limited waiver of sovereign immunity, or to waive or extinguish any defense which either party to this contract or their respective agents and employees may have to an action or suit by a third party.

Contractor's Responsibility for Work

Until the County accepts the work, it shall be in the custody and under the charge and care of the Contractor. The Contractor shall restore and replace, at the Contractor's expense, any lost or stolen County-owned material in the Contractor's custody or control. Damages to any portion of the work before its completion and acceptance, caused by the action of the elements or from any other reason, shall be restored or replaced at the Contractor's expense. Issuance of a payment estimate on any part of the work done will not be considered as final acceptance of any work completed up to that time. The County may, in its discretion, make such adjustments as it considers being proper for damage to the work due to unforeseeable causes beyond the control of, and without fault or negligence on the part of the Contractor.

Liability Insurance Requirements

The Contractor shall procure and maintain at its own expense, until acceptance of the project by the County, liability insurance for all damages and losses imposed by law and assumed under the contract, of the kinds and in the amounts specified in the relevant sections shown herein. Before the Contractor commences the work, the Contractor shall require the insurance company or companies to furnish to the County evidence of such insurance showing compliance with these specifications. All insurance required herein shall be occurrence policies in a form acceptable to the County, and shall remain in force until all work required to be performed under the terms of the contract is satisfactorily completed as evidenced by its formal acceptance by the County.

Each policy or its declaration pages shall provide that the policy shall not be materially changed of canceled until the County has been given at least 30 days advance notice in writing. If any policy is canceled before the contract work is complete, a satisfactory replacement policy must be in force, with notice and evidence of insurance submitted to the County, prior to the effective date of cancellation of the former policy. All evidence of insurance and notices shall be submitted to: Director of Public Works, Jefferson County Public Works Department, 725 Maple Street, PO Box 100, Hillsboro, Missouri 63050. **The Contractor shall furnish the County with a complete copy of the policy prior to the time the Contractor commences work on the site of the project**. Failure to furnish evidence of proper insurance, or complete insurance policies will result in temporary suspension of work and may result in other claims or actions for breach of contract or otherwise, as may be recognized at law or in equity.

Workers' Compensation Liability Insurance

The Contractor shall furnish evidence to the County that, with respect to the operations it performs, it carries workers' compensation insurance, or is qualified as self-insured, sufficient to comply with all its obligations under state laws relating to worker's compensation. The Contractor shall also require each subcontractor on the project to furnish the same evidence to the County. This evidence shall be furnished to and approved by the County prior to the time the Contractor or the subcontractor commences work on the site of the project.

Commercial General Liability Insurance

The Contractor shall obtain one or more occurrence-based policies of commercial general liability insurance (Form CG 00 01 or equivalent), which provide coverage for the contract work. The minimum limits of liability for commercial general liability insurance shall be: $1,000,000 each bodily injury or property damage occurrence, combined single limit, $2,000,000 general aggregate with a per project endorsement and $1,000,000 products/completed operations aggregate. Each such policy shall be endorsed so as to cover liability arising from blasting if applicable, other inherently dangerous activities and underground property damage. Each such policy shall be endorsed to include broad form general liability, contractual liability and completed operations coverage.

Commercial Auto Liability Insurance

The Contractor shall obtain one or more occurrence-based policies of auto liability insurance, which provide for its owned, non-owned and hired vehicles of every type and description, which are used in the contract work. The minimum limits of liability for such insurance shall be $1,000,000 combined single limit.

Additional Insureds

Each such policy of commercial general liability insurance shall name the County of Jefferson and its employees as additional insureds. Each commercial general liability insurance policy shall also contain a separation of insureds condition. The insurance afforded by the Contractor shall be primary insurance.

Subcontractor's Coverage

If any part of the contract is subcontracted, each subcontractor, or the Contractor on behalf of the subcontractor, shall obtain the same commercial general liability insurance and commercial automobile liability insurance coverage. The commercial general liability insurance shall name the same entities specified above as additional insureds, and shall have the same separation of insureds conditions.

Railroad Protective Liability Insurance

In addition to other required liability insurance, the Contractor shall provide railroad protective liability insurance if applicable, for and in behalf of the railroad as outlined in provisions for each project. The insurance policy shall be submitted to the County in original and duplicate for approval. No work will be permitted on the railroad right of way until such approval is granted.

Insurance with Other Than Missouri Companies

Any insurance policy required as specified above, if written by and insurance company organized in a state other than Missouri, shall be signed by an agent or broker licensed by the State of Missouri. In the case of policies written by companies organized in a state other than Missouri, the evidence of insurance submitted as authorized in the contract shall be signed by an agent or broker licensed by the State of Missouri. Nothing in this provision limits or waives the requirement that each insurance policy must be issued by a company authorized to issue such insurance in Missouri.

Third Party Liability

Neither the State of Missouri, the County of Jefferson nor the Contractor, by execution of the contract including these specifications, intend to create a right of action in a third party beneficiary except as specifically set out in these specifications and the contract. It is not intended by any required contractual liability in the contract or in these specifications that any third party beneficiary has a cause of action arising out of the condition of the project when completed in accordance with the plans and accepted by the County.

Personal Liability of Public Officials

There shall be no personal liability upon the County, or any member, employee or agent of the County in carrying out any of the provisions of the contract or in exercising any power or authority granted to them, it being understood that in such matters they act as agents and representatives of the County, with official and public duty doctrine immunity. If any provision of the contract appears to impose a duty on such an individual, the duty remains exclusively that of the County and is not a personal duty or obligation of the individual.

32. BOND:

The Contractor at his expense shall, before commencing work hereunder, procure and deliver to

the Owner a Performance Bond and a Labor and Materials Payment Bond in the amount of 100% of the contract as awarded, as security for the faithful performance of the contract and the payment of all obligations thereunder by the Contractor and his subcontractors. The Bonds shall be written in such form as may be satisfactory to the Owner and provided by a guaranty or surety company listed in the latest issue of U.S. Treasury Circular 570 and the penal sum shall be within the maximum specified for such company in said Circular 570. In substance, the condition of the obligation under said bond or bonds shall be as follows:

"The condition of this obligation is such that if the above bound Principal shall in all respects comply with the terms and conditions of said contract and his obligations thereunder, including the specifications and plans referred to therein, and such changes and alterations as may be made in said contract, specifications and plans and shall indemnify and save harmless the Owner against or from all costs, expenses, damages, injuries or losses to which the said Owner may be subjected by reason of any wrongdoing, misconduct, want of care or skill, negligence of default on the part of said Principal, his subcontractors, officers, agents or employees, in the execution of performance of said contract and shall promptly pay all just claims for damages for injury to property and for labor, equipment, materials and supplies incorporated in the work or consumed in the performance thereof incurred by said Principal, his subcontractors, officers, agents or employees, in or about the construction or improvement contracted for, then this obligation shall be void; otherwise, to remain in full force and virtue in law. The Surety hereby waives notice of any changes, alterations or modifications, including any extensions of the period of performance, in the contract, specifications and plans."

If any surety upon any bond furnished in connection with this contract becomes unacceptable to the Owner, or if any such surety fails to furnish reports as to his financial condition from time to time as requested by the Owner, the Contractor shall promptly furnish such additional security as may be required from time to time to protect the interests of the Owner and of persons supplying labor or materials in the prosecution of the work contemplated by this contract.

33. ASSIGNMENT, SUBLETTING OR SUBCONTRACTING:

The Contractor shall not assign, sublet or subcontract this Contract or the work or payments due thereunder, in whole or in part, without the express consent of the Owner.

The Owner's consent to subcontract shall not relieve the Contractor from his obligations hereunder or change the terms of this agreement.

34. ROYALTIES AND PATENTS:

The Contractor shall indemnify, defend and save harmless the Owner and the Consultant from all liabilities, decrees, judgments, claims or disbursements, including attorney fees and/or damages and expenses which may come against or be incurred by the Owner or the Consultant by reason of the use of any patented material, machinery, devices, equipment or processes furnished or used in the performance of the work under this contract or the use by the Owner of the completed structure or by reason of the use of patented designs furnished by the Contractor and accepted by the Owner. In the event any claim, action at law or suit in equity of any kind whatsoever is made or brought against the Owner, the Owner shall have the right, without impairment of the foregoing indemnification, to retain from the money due and to become due said Contractor a sufficient amount of money to protect itself against loss.

35. SPECIFICATION CONFLICTS:

Where any provision of specifications referred to or incorporated into the Contract Documents is inconsistent or in conflict with the provisions of the Contract Documents, the provisions of the Contract Documents shall govern.

36. STANDARDS:

Where materials and methods are indicated in the specifications as being in conformance with a standard specification, reference in all cases shall be to the latest edition of the specification and shall include all interim revisions, unless specifically stated otherwise.

37. FEDERAL EMPLOYMENT AUTHORIZATION:

The Contractor shall comply with the requirements of the revised Statutes of the State of Missouri Chapter sections 285.525 to 285.555. If any part of the contract is subcontracted, each subcontractor shall comply with the same requirements of this specification.

No Contractor shall knowingly employ, hire for employment, or continue to employ an unauthorized alien to perform work within the state of Missouri.

As a condition for the award of the contract the Contractor shall, by sworn affidavit and provision of documentation, affirm its enrollment and participation in a federal work authorization program with respect to the employees working in connection with the contracted services. Every such Contractor shall also sign an affidavit affirming that it does not knowingly employ any person who is an unauthorized alien in connection with the contracted services.

A Contractor may enroll and participate in a federal work authorization program and shall verify the employment eligibility of every employee in the Contractor's hire whose employment commences after the Contractor enrolls in a federal work authorization program.

A general contractor or subcontractor of any tier shall not be liable under sections 285.525 to 285.550 when such general contractor or subcontractor contracts with its direct subcontractor who violates subsection 1 of this section, if the contract binding the contractor and subcontractor affirmatively states that the direct subcontractor is not knowingly in violation of subsection 1 of this section and shall not henceforth be in such violation and the contractor or subcontractor receives a sworn affidavit under the penalty of perjury attesting to the fact that the direct subcontractor's employees are lawfully present in the United States.

38. OSHA TRAINING:

The Contractor shall comply with the requirements of the revised Statutes of the State of Missouri Chapter sections 292.675. If any part of the contract is subcontracted, each subcontractor shall comply with the same requirements of this specification.

Any Contractor signing a contract to work on the construction of public works for the Owner shall provide a ten-hour Occupational Safety and Health Administration (OSHA) construction safety program for their on-site employees which includes a course in construction safety and health approved by OSHA or a similar program approved by the department which is at least as stringent as an approved OS11A program. All employees are required to complete the program

within sixty (60) days of beginning work on such construction project.

Any employee found on a worksite subject to this section without documentation of the successful completion of the course required under this section shall be afforded twenty (20) days to produce such documentation before being subject to removal from the project. The contractor shall forfeit as a penalty to the Owner two thousand five hundred dollars ($2,500) plus one hundred dollars ($100) for each employee employed by the contractor or subcontractor, for each calendar day, or portion thereof, such employee is employed without the required training. The penalty shall not begin to accrue until the time period in this section has elapsed.

The Owner shall withhold and retain all sums and amounts due and owing as a result of any violation of this section when making payments to the contractor under the contract. The contractor may withhold from any subcontractor, sufficient sums to cover any penalties the Owner has withheld from the contractor resulting from the subcontractor's failure to comply with the terms of this section. If the payment has been made to the subcontractor without withholding, the contractor may recover the amount of the penalty resulting from the fault of the subcontractor in an action maintained in the circuit court in the county in which the public works project is located from the subcontractor.

In determining whether a violation of this section has occurred, and whether the penalty of this section shall be imposed, the Department of Labor and Industrial Relations shall investigate any claim of violation. Upon completing such investigation, the Department shall notify the Owner and any party found to be in violation of this section of its findings and whether a penalty shall be assessed. Determinations under this section may be appealed in the circuit court in the county in which the public works project is located. The Department may establish rules and regulations for the purpose of implementing the provisions of this section.

This section shall take effect on August 28, 2009.

END OF GENERAL CONDITIONS

General Special Provisions

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AFFIDAVIT
COMPLIANCE WITH THE PREVAILING WAGE LAW

Before me, the undersigned Notary Public, in and for the County of_____, State of _____, personally came and appeared_____

(Name)

_____of_____

(Title) (Company Name)

(a corporation)(a partnership)(a proprietorship) and after being duly sworn did depose and say that all provisions and requirements set out in Chapter 290, Sections 290.210 through and including 290.340, Missouri Revised Statutes, pertaining to the payment of wages to workers employed on public works projects have been fully satisfied and there has been no exception to the full and complete compliance with said provisions and requirements with Wage Determination No._____ or Annual Wage Order No._____ issued by the Division of Labor Standards on project_____,

(Job Number)

_____,

(Route or location, if building construction)

_____ County, Missouri, and completed on the ____ day of _____, 20___.

_____
Signature

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

My commission expires _____, 20_____.

Notary Public

(Revised 03-23-00)

COOPERATION WITH UTILITIES

All utility facilities and appurtenances within the project limits shall be located or relocated by the utility owner, unless otherwise specified. Locations of these utilities will be provided by the utility owners and may not be exact, particularly with regard to underground installations. The contractor shall call for locates prior to the start of any work.

The contractor shall lead the efforts to coordinate with utility owners and the engineer in the location and relocation of utility facilities to minimize effects upon the contractor's work, interruption to utility service and duplication of work by the utility owners. Facilities or appurtenances that are to remain in place during construction shall be accounted for and protected by the contractor's work procedures.

In the event utility services are interrupted as a result of damage within the project limits, the contractor shall notify the appropriate utility authorities and cooperate with the utility owners until service has been restored. Work shall not begin around fire hydrants until provisions for continued service have been made and approved by the local fire authority.

When the failure of the owners of utility facilities to cooperate and coordinate their work with that of the contractor results in actual delay to the contractor in the overall completion of the contractor's work, such delay will be considered in the count of working days or date specified for completion as contractor's sole compensation from the County, provided the contractor notified the engineer in writing of the delay at the time the delay occurred.

The contractor shall use every precaution to prevent damage to all public and private utilities. Repairs to damaged utilities caused by negligent or wrongful acts or omissions on the part of the contractor shall be corrected at the contractor's expense. Damaged facilities shall be restored to a condition similar or equal to that existing before the damage occurred. The utility will designate who shall repair the damaged facility and the contractor shall not make repairs without utility approval.

Should there be located within the right of way any public or private utility facilities that are to remain in place and which will interfere with the contractor's proposed methods of operation, the contractor, in cooperation with the engineer, shall make all necessary arrangements with the owner for any temporary or permanent removal or relocation of such facilities desired for the contractor's convenience. Any cost involved shall be at the contractor’s expense.

If utility facilities or appurtenances are found that are not noted in the contract documents and could not be discovered in accordance with Sec 102.5 of the Missouri Standard Specifications, the engineer shall be notified in writing as soon as possible of the conflict and will determine whether relocation of the utility is necessary to accommodate construction. If relocation is necessary, the contractor will make the necessary arrangements with the utility owner. Compensation for the relocation of utilities will be worked out between the County and the utility owner prior to the relocation of any utility. No additional compensation will be made to the contractor for coordinating the location and/or relocation of utilities.

SUBLETTING OR ASSIGNING THE CONTRACT

The bidder is specifically advised that any person, firm or other party to whom it is proposed to award a subcontract under this contract must be acceptable to the County.

Second tier subcontracting will not be permitted on this project. It will be the responsibility of the Contractor to insure that his subcontractors do not, in turn, subcontract any portion of the work.

The Contractor shall furnish to the County a signed copy of all subcontracts at or before the pre-construction meeting. This applies to Federal and local projects.

The Prime Contractor must perform with it's own organization, contract work amounting to not less than 30% of the total original contract price. This applies to Federal and local projects.

WARRANTIES AND GUARANTEES

Clauses that require the contractor to guarantee materials and workmanship and otherwise maintain the work for a specified period after satisfactory completion and final acceptance will not be approved. This is not even permissible as a non-participating bid item.

Routine warranties or guarantees provided by a manufacturer are valid. Contractors' warranties or guarantees providing for satisfactory in-service operation of mechanical and electrical equipment and relates components for a period not to exceed six (6) months following project acceptance are permissible.

INSPECTION BY JEFFERSON COUNTY

The Contractor shall assure that representatives of the County shall have the opportunity at any time to inspect and review the work done by the Contractor and his subcontractors on this project and shall grant them access to all parts of the work.

MATERIAL TESTING

All project sampling and testing of materials shall be performed by the County or by a consultant employed by the County. The Contractor shall assure representatives of the County or consultants employed by the County have had the opportunity to sample and test materials used on this project. Acceptance testing specified to be conducted by County or Consultant hired by County. Costs associated with providing the sample materials shall be incidental to the cost of the project.

TRAFFIC CONTROL

The Traffic Control Plan for this project must follow the Federal Highway Administration's Manual On Uniform Traffic Control Devices (MUTCD 2009) for all traffic control operations.

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

The County's Storm Water Pollution Prevention Plan will be as stated in this General Special Provision and/or as shown on the plans.

The primary purpose of this plan is to protect the public and waterways from the adverse effects of construction.

For all of Jefferson County projects, the County's "Erosion and Sediment Control/Storm Water Management Design Manual" shall be followed. A copy of that manual is available on the Jefferson County website at:

http//www.jeffcomo.org/StormwaterErosion.aspx?nodeID=StormwaterDivision

For projects without a drawing showing erosion and sediment control measures, the Engineer or his representative will direct what measures are to be used and where they will be placed. Pay items for these measures will be in the table of "ESTIMATED QUANTITIES". Any measures not covered by a pay item or not specifically addressed on the Plans or Specifications will be by negotiated price.

Maintenance of any item utilized, will be considered incidental to that pay item. Maintenance shall be considered as the repair or replacement of any measure paid for, but not properly functioning before final acceptance of the project. Maintenance shall take place at the time as directed by the Engineer.

Concrete wash down pits shall be utilized for the washing of all concrete trucks. The pits shall be of adequate size to handle all wash down water. The pits shall be lined with a plastic liner (10 mil minimum) to prevent the seepage of the water into the adjoining ground. Berms may be necessary to prevent the migration of any splash water into the streams. The hardened waste from the wash down pits shall be removed and broken into pieces no larger than one cubic foot. The waste concrete pieces may be used as revetment, but will not be considered in measurement for payment. The cost of the wash down pits, berms and disposal shall be incidental to the cost of the concrete.

Any spillage of hazardous waste shall be cleaned up by the Contractor at no additional cost to the Owner. Measures shall be taken to ensure that no hazardous waste reaches a stream or adjoining property.

Any fines assessed for not following the SWPPP, will be the sole responsibility of the Contractor. If the Owner is fined by a State or Federal agency, liquidated damages in the amount of the fine will be charged to the Contractor by the Owner. Contractor agrees that it shall remit payment for said liquidated damages immediately upon request by Owner. Failure to do so may, at the Owner's option, be considered a breach of contract thereby entitling Owner to such other damages as may result. These damages shall be in addition to the liquidated damages described in this paragraph.

STATE WAGE RATES
(ALL projects)

Wage rates can be found at the following websites, or by contacting the Missouri Department of Labor:

http://www.labor.mo.gov/DLS/prevailingwage

or

http://www.modot.org/business/contractor_resources/bidOpenIndex.htm

This contract requires payment of the prevailing hourly rate of wages for each craft or type of worker required to execute the contract as determined by the Missouri Department of Labor and Industrial Relations. The applicable State Wage Rates for this contract are detailed in the "Annual Wage Order" that is effective 10 calendar days prior to bid opening. These supplemental bidding documents have important legal consequences. It shall be conclusively presumed that they are in the bidder's possession, and they have been reviewed and used by the bidder in the preparation of any bid submitted on this project.

Job Special Provisions for the

Construction of a New Maintenance Building For Jefferson County's Light Vehicle Fleet in Hillsboro, Missouri

Public Works Director:
Jason Jonas, P.E.

Architect:
Steven J. Bacon;
Bacon Commercial Design LLC
PO Box 605/100-A Bailey Road
Crystal City, Missouri 63019
phone (636) 933-0007

Structural Engineer:
Frontenac Engineering
2725 Sutton Boulevard
St. Louis, MO 63143
(314) 644-2200

M/E/P Engineer:
FF Freiner, P.E.
12138 Lowill Avenue
St. Louis, MO 63126
(314) 843-7157

Site/Civil Engineer:
Vonarx Engineering
10785 Business 21; Suite A
Hillsboro, MO 63050
(636) 797-8425

Issue Date: 2/04/2015
project number: 13-091

printed set #: _____

JEFFERSON COUNTY LIGHT VEHICLE FLEET MAINTENANCE FACILITY

PROJECT MANUAL TABLE OF CONTENTS 238 PP

SECTION 00-0001

DIVISION 00 - PROCUREMENT

SECTION 00-0102

PROJECT INFORMATION

PART 1 GENERAL

1.01 PROJECT IDENTIFICATION

A. Project Name: Construct a new Light Fleet Maintenance Building, located at Jefferson County (Hillsboro), Missouri.

B. Project Number: PW14B005BLD.

C. The Owner, hereinafter referred to as Owner: Jefferson County Public Works Department.

D. Owner's Project Manager: Architect.

1.02 NOTICE TO PROSPECTIVE BIDDERS

A. These documents constitute an Invitation to Bid to General Contractors for the construction of the project described below.

1.03 PROJECT DESCRIPTION

A. Summary Project Description: Single Story slab on grade, pre-engineered steel building; with all steel siding and roof; with associated site and utility improvements..

B. Contract Scope: Construction.

C. Contract Terms: Lump sum (fixed price, stipulated sum).

1.04 PROJECT CONSULTANTS

A. The Architect, hereinafter referred to as Architect: Steven Bacon; Bacon Commercial Design LLC.
   1. PO Box 605; Crystal City, MO 63019. 636-933-0007. SJBacon@BCD-LLC.com

B. Mechanical/Electrical Engineer: FF Freiner, PE; 314-843-7157

C. Structural Engineering: Frontenac Engineering; Josh Schmitz, PE; (314) 644-2200

D. Site/Civil Design Engineer: Vonarx Engineering; David Vonarx, PE; (636) 797-8425

END OF SECTION

SECTION 00-3100

AVAILABLE PROJECT INFORMATION

PART 1 GENERAL

1.01 EXISTING CONDITIONS

A. Certain information relating to existing surface and subsurface conditions and structures is available to bidders but will not be part of the Contract Documents, as follows:

B. Geotechnical Report: Entitled Light Fleet Vehicle Maintenance Facility;, dated June 2014.
   1. Electronic copy is attached to this project manual.
   2. This report, by its nature, cannot reveal all conditions that exist on the site. Should subsurface conditions be found to vary substantially from this report, changes in the design and construction of foundations will be made, with resulting credits or expenditures to the Contract Price accruing to Owner.

END OF SECTION

SECTION 01-0001

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01-1000

SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. Project Name: Light Fleet Maintenance Building.

B. Owner's Name: Jefferson County (Missouri) Public Works Department.

C. Architect's Name: Bacon Commercial Design LLC.

1.02 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on a total lump sum bid.

1.03 WORK BY OWNER

A. Owner will supply and install the following:
   1. Toilet Room dispensers (toilet tissue, paper towel), waste receptacles.
   2. PVC vision screening material on interior security fencing.
   3. Air Compressor and Oil Pumping system; GC to provide distribution piping for Owner connection..

1.04 FUTURE WORK

A. Provide exhaust outlet at Break Room for future installation of kitchen exhaust fan.

1.05 OWNER OCCUPANCY

A. Owner intends to occupy the Project upon Substantial Completion.

B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

C. Schedule the Work to accommodate Owner occupancy.

1.06 CONTRACTOR USE OF SITE AND PREMISES

A. Arrange use of site and premises to allow:
   1. Work by Others.
   2. Work by Owner.

B. Provide access to and from site as required by law and by Owner:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
   2. Do not obstruct roadways, sidewalks, or other public ways without permit.

C. Existing building spaces may not be used for storage.

D. Utility Outages and Shutdown:
   1. Limit shutdown of utility services to eight hours at a time, arranged at least 24 hours in advance with Owner.
   2. Prevent accidental disruption of utility services to other facilities.

END OF SECTION

SECTION 01-2000

PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Documentation of changes in Contract Sum and Contract Time.

1.02 SCHEDULE OF VALUES

A. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.

B. Forms filled out by hand will not be accepted.

1.03 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.

C. Forms filled out by hand will not be accepted.

D. Execute certification by signature of authorized officer.

E. Submit three copies of each Application for Payment.

F. Include the following with the application:
   1. Affidavits attesting to off-site stored products.
   2. Lien Waivers documentation the receipt of previously paid monies by the respective subcontractors and suppliers.

G. When Architect requires substantiating information, submit data justifying dollar amounts in question.

H. Include a cost breakdown following the format provided at end of this section. This itemization is required for Owner's submttals relating to Historic Preservation Tax Credits.

END OF SECTION

SECTION 01-3000

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preconstruction meeting.

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

C. Number of copies of submittals.

D. Submittal procedures.

1.02 PROJECT COORDINATION

A. Project Coordinator: General Contractor.

B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for shed facility access, traffic, and parking facilities.

C. During construction, coordinate use of site and facilities through the Project Coordinator.

D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities.

F. Coordinate field engineering and layout work under instructions of the Project Coordinator.

G. Make the following types of submittals to Architect through the Project Coordinator:
   1. Requests for interpretation.
   2. Requests for substitution.
   3. Shop drawings, product data, and samples.
   4. Test and inspection reports.
   5. Manufacturer's instructions and field reports.
   6. Applications for payment and change order requests.
   7. Progress schedules.
   8. Coordination drawings.
   9. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

A. Architect will schedule a meeting after acceptance of bid.

B. Attendance Required:
   1. Owner.
   2. Architect.
   3. Contractor.
   4. Major Subcontractors' representatives.

C. Agenda:

   1. Distribution of Contract Documents.
   2. Designation of personnel representing the parties to Contract, County and Architect.
   3. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   4. Scheduling.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.02 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Shop drawings.
   3. Samples for selection.
   4. Samples for verification.

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

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

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

3.03 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer's instructions.
   6. Manufacturer's field reports.
   7. Other types indicated.

B. Submit for Architect's knowledge as contract administrator or for Owner. No action will be taken.

3.04 SUBMITTALS FOR PROJECT CLOSEOUT

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

B. Submit for Owner's benefit during and after project completion.

3.05 NUMBER OF COPIES OF SUBMITTALS

A. Documents for Review:
   1. Small Size Sheets, Not Larger Than 8-1/2 x 11 inches: Submit the number of copies that Contractor requires, plus two copies that will be retained by Architect.
   2. Larger Sheets, Not Larger Than 36 x 48 inches: Submit the number of opaque reproductions that Contractor requires, plus two copies that will be retained by Architect.

B. Documents for Information: Submit two copies.

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

3.06 SUBMITTAL PROCEDURES

A. Transmit each submittal with a copy of approved submittal form.

B. Transmit each submittal with transmittal.

C. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.

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

E. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

F. Deliver submittals to Architect at business address.

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

H. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.

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

J. Provide space for Contractor and Architect review stamps.

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

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

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

END OF SECTION

SECTION 01-4000

QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Control of installation.

B. Testing and inspection services.

1.02 SUBMITTALS

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

1.03 TESTING AND INSPECTION AGENCIES

A. Owner will employ and pay for services of an independent testing agency to perform specified testing.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

PART 3 EXECUTION

2.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have Work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

2.02 TESTING AND INSPECTION

A. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.
   3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   4. Promptly notify Architect and Contractor of observed irregularities or non-conformance of Work or products.
   5. Perform additional tests and inspections required by Architect.
   6. Submit reports of all tests/inspections specified.

B. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the Work.

C. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
   3. Provide incidental labor and facilities:

a. To provide access to Work to be tested/inspected.
b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
c. To facilitate tests/inspections.
d. To provide storage and curing of test samples.

4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

D. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect.

E. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.

2.03 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not conforming to specified requirements.

B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01-4100

REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Regulatory requirements applicable to this project are the following:

B. 28 CFR 36 - Department of Justice accessibility regulations relating to public accommodations; current edition.

C. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

D. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

E. 29 CFR 1910 - Occupational Safety and Health Standards; current edition; as a work place.

F. ICC (IFC) - ICC International Fire Code, 2009.

G. NFPA 101 - Life Safety Code, 2006.

H. ICC (IBC) - ICC International Building Code, 2009.

I. ICC (IPC) - ICC International Plumbing Code, 2009.

J. ICC (IMC) - ICC International Mechanical Code, 2009.

K. ICC (IFGC) - ICC International Fuel Gas Code, 2009.

L. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

END OF SECTION

SECTION 01-4216

DEFINITIONS

PART 1 GENERAL

1.01 SUMMARY

A. Other definitions are included in individual specification sections.

1.02 DEFINITIONS

A. Furnish: To supply, deliver, unload, and inspect for damage.

B. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.

C. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.

D. Project Manual: The book-sized volume that includes the procurement requirements (if any), the contracting requirements, and the specifications.

E. Provide: To furnish and install.

F. Supply: Same as Furnish.

END OF SECTION

SECTION 01-5000

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary utilities.

B. Temporary sanitary facilities.

C. Waste removal facilities and services.

D. Project identification sign.

E. Field offices.

1.02 TEMPORARY UTILITIES

A. New permanent facilities may not be used.

B. Use trigger-operated nozzles for water hoses, to avoid waste of water.

1.03 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Maintain daily in clean and sanitary condition.

1.04 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way .

C. Provide protection for plants designated to remain. Replace damaged plants.

D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.05 EXTERIOR ENCLOSURES

A. Provide temporary weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.06 SECURITY - SEE SECTION 01-3553

A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

1.07 WASTE REMOVAL

A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

B. Provide containers with lids. Remove trash from site periodically.

C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.08 PROJECT IDENTIFICATION

A. Erect on site at location established by Architect.

B. Provide project identification sign of design, construction, and location approved by Owner.

C. No other signs are allowed without Owner permission except those required by law.

1.09 FIELD OFFICES

A. Office: Weathertight, with lighting, electrical outlets, heating, ventilating equipment, and equipped with sturdy furniture, drawing rack and drawing display table.

B. Provide space for Project meetings, with table and chairs to accommodate 4 persons.

C. Locate offices a minimum distance of 30 feet from existing and new structures.

1.10 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.

B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore new permanent facilities used during construction to specified condition.

END OF SECTION

SECTION 01-5100

TEMPORARY UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary Utilities: Electricity, lighting, heat, ventilation, and water.

1.02 TEMPORARY ELECTRICITY

A. Cost: By Contractor.

B. Provide power service required from utility source.

C. Provide power outlets for construction operations, with branch wiring and distribution boxes located at each floor. Provide flexible power cords as required.

D. Provide main service disconnect and over-current protection at convenient location and meter.

E. Permanent convenience receptacles may not be utilized during construction.

F. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

1.03 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. Provide and maintain incandescent lighting for construction operations to achieve a minimum lighting level of 2 watt/sq ft .

B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.

C. Maintain lighting and provide routine repairs.

D. Permanent building lighting may be utilized during construction.

1.04 TEMPORARY HEATING

A. Cost of Energy: By Contractor.

B. Provide heating devices and heat as needed to maintain specified conditions for construction operations.

C. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

D. Existing facilities shall not be used.

E. Prior to operation of permanent equipment for temporary heating purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

1.05 TEMPORARY VENTILATION

A. Existing ventilation equipment may not be used.

1.06 TEMPORARY WATER SERVICE

A. Cost of Water Used: By Owner.

B. Connect to existing water source.
   1. Exercise measures to conserve water.

C. Extend branch piping with outlets located so water is available by hoses with threaded connections.

END OF SECTION

SECTION 01-6000

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Transportation, handling, storage and protection.

B. Product option requirements.

C. Substitution limitations and procedures.

D. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 SUBMITTALS

A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by the Contract Documents.

B. DO NOT USE products having any of the following characteristics:

1. Made using or containing CFC's or HCFC's.
2. Made of wood from newly cut old growth timber.

C. Where all other criteria are met, Contractor shall give preference to products that:

1. If used on interior, have lower emissions, as defined in Section 01-6116.
2. If wet-applied, have lower VOC content, as defined in Section 01-6116.
3. Have a published GreenScreen Chemical Hazard Analysis.

2.02 PRODUCT OPTIONS

A. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

B. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.03 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION PROCEDURES

A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

C. A request for substitution constitutes a representation that the submitter:

1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
2. Will provide the same warranty for the substitution as for the specified product.

3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
4. Waives claims for additional costs or time extension that may subsequently become apparent.

D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

E. Substitution Submittal Procedure:
1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
3. The Architect will notify Contractor in writing of decision to accept or reject request.

3.02 TRANSPORTATION AND HANDLING

A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

B. Transport and handle products in accordance with manufacturer's instructions.

C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

F. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

G. Prevent contact with material that may cause corrosion, discoloration, or staining.

H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01-7000

EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Pre-installation meetings.

C. Cutting and patching.

D. Surveying for laying out the work.

E. Cleaning and protection.

F. Starting of systems and equipment.

G. Demonstration and instruction of Owner personnel.

H. Closeout procedures, except payment procedures.

I. General requirements for maintenance service.

1.02 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

1.03 SUBMITTALS

A. See Section 01-3000 - Administrative Requirements, for submittal procedures.

B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Visual qualities of sight exposed elements.
   5. Work of Owner or separate Contractor.
   6. Include in request:
      a. Identification of Project.
      b. Location and description of affected work.
      c. Necessity for cutting or alteration.
      d. Description of proposed work and products to be used.
      e. Alternatives to cutting and patching.
      f. Effect on work of Owner or separate Contractor.
      g. Written permission of affected separate Contractor.
      h. Date and time work will be executed.

C. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.04 QUALIFICATIONS

A. For survey work, employ a land surveyor registered in Missouri and acceptable to Architect. Submit evidence of Surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate.

1.05 PROJECT CONDITIONS

A. Use of explosives is not permitted.

B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

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

D. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

E. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
   1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.

2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.

F. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
   1. Minimize amount of bare soil exposed at one time.
   2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
   3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
   4. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
   5. Comply with any Storm Water Management Plans filed by the Owner or his consultants relative to this project site.

G. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.

H. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.

I. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

J. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.06 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Notify affected utility companies and comply with their requirements.

C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and clean-up of work of separate sections.

G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01-6000.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Architect two days in advance of meeting date.

D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.

E. Record minutes and distribute copies within two days after meeting to participants, with ____ copies to Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Architect of any discrepancies discovered.

C. Contractor shall locate and protect survey control and reference points.

D. Control datum for survey is that indicated on Drawings.

E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

F. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

G. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

H. Utilize recognized engineering survey practices.

I. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations; and _____.
   2. Grid or axis for structures.
   3. Building foundation, column locations, ground floor elevations, and _____.

J. Periodically verify layouts by same means.

K. Maintain a complete and accurate log of control and survey work as it progresses.

L. On completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

3.05 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. Perform whatever cutting and patching is necessary to:
   1. Complete the work.
   2. Fit products together to integrate with other work.
   3. Provide openings for penetration of mechanical, electrical, and other services.
   4. Match work that has been cut to adjacent work.
   5. Repair areas adjacent to cuts to required condition.
   6. Repair new work damaged by subsequent work.
   7. Remove samples of installed work for testing when requested.
   8. Remove and replace defective and non-conforming work.

C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

D. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

E. Restore work with new products in accordance with requirements of Contract Documents.

F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

G. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07-8400, to full thickness of the penetrated element.

H. Patching:
   1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
   2. Match color, texture, and appearance.
   3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.07 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.08 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

3.09 SYSTEM STARTUP

A. Coordinate schedule for start-up of various equipment and systems.

B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

D. Verify that wiring and support components for equipment are complete and tested.

E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.10 DEMONSTRATION AND INSTRUCTION

A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

C. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of owner personnel.

D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

3.11 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.12 FINAL CLEANING

A. Execute final cleaning after Substantial Completion but before making final application for payment.

B. Use cleaning materials that are nonhazardous.

C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces,

D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

F. Clean filters of operating equipment.

G. Clean debris from roofs, gutters, downspouts, and drainage systems.

H. Clean site; sweep paved areas, rake clean landscaped surfaces.

I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.13 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.

B. Notify Architect when work is considered ready for Substantial Completion.

C. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's review.

D. Correct items of work listed in executed Certificates of Substantial Completion and comply with requirements for access to Owner-occupied areas.

E. Notify Architect when work is considered finally complete.

F. Complete items of work determined by Architect's final inspection.

3.14 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than six months from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

SECTION 01-7800

CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project Record Documents.

B. Operation and Maintenance Data.

C. Warranties and bonds.

1.02 SUBMITTALS

A. Project Record Documents: Submit documents to Architect prior to approval of final application for payment..

B. Operation and Maintenance Data:
   1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
   2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
   4. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Addenda.
   3. Change Orders and other modifications to the Contract.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Record Drawings : Legibly mark each item to record actual construction including:
   1. Measured depths of foundations in relation to finish first floor datum.
   2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   4. Field changes of dimension and detail.
   5. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.
   3. Include performance curves, with engineering data and tests.
   4. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

E. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

F. Provide servicing and lubrication schedule, and list of lubricants required.

G. Include manufacturer's printed operation and maintenance instructions.

H. Include sequence of operation by controls manufacturer.

I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

J. Provide control diagrams by controls manufacturer as installed.

K. Include test and balancing reports.

L. Additional Requirements: As specified in individual product specification sections.

3.04 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.

F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

H. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.

I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

3.05 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

END OF SECTION

SECTION 02-0002

DIVISION 2 - SITE WORK

SECTION 02051

GENERAL SITE CONSTRUCTION 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 before performing any work on site, contact 1-800-DIG-Rite to arrange for utility location services.
   2. Perform minor, investigative excavations to verify location of various existing 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 investigative excavating 10 days minimum 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 And 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 not 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.

D. Any pavement damaged during construction shall be removed and replaced to the satisfaction of the Owner, geotechnical engineer and the Architect.

3.4 FIELD QUALITY CONTROL

A. Notify Architect 48 hours before performing excavation or fill work.

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

C. 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 02230

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 02051 - General Site Construction Requirements
   2. Section 02312 - 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 and stored for reuse, less vegetation layer stripped and disposed of as specified in Paragraph 3.1,C below.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 PERFORMANCE

A. Tree And 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. Entirely remove roots of plants which normally sprout from roots, as identified by Architect.

C. Stripping
   1. Strip existing vegetation layer 6 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 6 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 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.

SECTION 02230

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 02051 - General Site Construction Requirements
   2. Section 02312 - 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 and stored for reuse, less vegetation layer stripped and disposed of as specified in Paragraph 3.1,C below.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 PERFORMANCE

A. Tree And 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. Entirely remove roots of plants which normally sprout from roots, as identified by Architect.

C. Stripping
   1. Strip existing vegetation layer 6 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 6 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 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.

SECTION 02311

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 02051 - General Site Construction Requirements

1.2 QUALITY ASSURANCE

A. Pre-Installation Conference
   1. Schedule conference after completion of site clearing but before beginning grading work.
   2. Identify benchmark to be used in establishing grades and review Contract Document requirements for grades, fill materials, and topsoil.
   3. 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 02315.

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 02230. Stockpile this additional topsoil with previously stripped topsoil.

3.2 PERFORMANCE

A. Site Tolerances
   1. Maximum variation from required grades shall be 1/10 of one foot.
   2. To allow for final finish grades of parking lot and planting areas, rough grade elevations before placing topsoil are -
      a. Sod Areas - 7 inches below top of walk or curb.
      b. Seeded Areas And Ground Cover Areas - 6 inches below top of walk or curb.
      c. Shrub Areas - 15 inches below top of walk or curb

B. When 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 02315.

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

END OF SECTION

SECTION 02315

EXCAVATION AND FILL

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. Procedure and quality for excavating, trenching, backfilling, and compacting performed on Project under other Sections unless specifically specified otherwise.

B. Related Sections
   1. Section 02051 - General Site Construction Requirements
   2. Section 02230 - Site Clearing
   3. Sections Under 02500 Heading - Utility Services
   4. Section 02630 - Storm Drainage
   5. Sections Under 02700 Heading - Compaction of sub-grade under walks and paving
   6. 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 1557-00, 'Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort'
   2. ASTM D 2216-98, 'Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock'
   3. ASTM D 2487-00, 'Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)'
   4. ASTM D 2922-96, 'Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)'
   5. ASTM D 3017-96, '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 Conference - Participate in pre-installation conference specified in Section 02311.

1.5 SEQUENCING

A. Do not backfill against bituminous dampproofing for 24 hours after application of dampproofing.

B. 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 MATERIALS

A. Site Material - Existing excavated material on site is suitable for use as fill and backfill to meet Project requirements.

B. Imported Fill / Backfill
   1. Well graded material conforming to ASTM D 2487 free from debris, organic material, frozen materials, brick, lime, concrete, and other material which would prevent adequate performance of backfill.
      a. Under Building Footprint And Paved Areas - Fill shall comply with soil classification groups GW, GP, GM, SW, SP, or SM. Fill 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. Under Landscaped Areas -
         1) Fill more than 36 inches below finish grade shall comply with soil classification groups GW, GP, GM, SW, SP, or SM. Fill 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.
         2) Fill less than 36 inches below finish grade shall comply with soil classification groups SW, SP, SM, or SC. Fill may not contain stones larger than 1-1/2 inches in any direction and 90 percent minimum of fill shall be smaller than 3/8 inch in any direction.

C. Excavatable Slurry Fill / Backfill
   1. Contain maximum of 94 lbs of cement per yard of slurry fill / 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. Acceptable Products -
      a. Darafill by W R Grace & Co, Cambridge MA (800) 354-5414 www.gcp-grace.com
      b. Equal as approved by Architect before use. See Section 01600.

D. Engineered Fill
   1.

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 PREPARATION

A. Protection of Existing Utilities
   1. Protect existing utilities identified in Contract Documents during excavation.
   2. If existing utility lines not identified in Contract Documents are encountered, contact Architect before proceeding.

B. Before placing fill, base, or finish work, prepare sub-grade as follows
   1. Under Building Slabs / Pads, Concrete Site Elements, And Portland Cement Concrete Driveways And Parking Areas - Scarify sub-grade 6 inches deep, moisture condition to uniform moisture content of between optimum and 4 percent over optimum, and mechanically tamp 6 inches deep to 90 percent minimum of relative compaction.
   2. Under Asphalt Concrete Driveways And Parking Areas - Scarify sub-grade 6 inches deep, moisture condition to uniform moisture content between optimum and 4 percent over optimum, and mechanically tamp to 95 percent minimum of relative compaction.
   3. Landscape Areas - Compact sub-grade to 85 percent relative compaction.

3.3 PERFORMANCE

A. Excavation
   1. Building Footings And Foundations -
      a. Excavate as necessary for proper placement and forming of footings and foundations.
      b. Bottom 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 And 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 Sections under 02700 heading.
      c. Remove and replace exposed material which becomes soft or unstable.
   3. Utility Trenches -
      a. Unless otherwise indicated, excavation shall be open cut. Short sections of trench may be tunneled if pipe or duct can be safely and properly installed and backfill can be properly tamped in tunnel sections and if approved by Architect.
      b. Excavate to proper alignment, depth, and grade. Excavate to sufficient width to allow adequate space for proper installation and inspection of utility piping.
      c. If trenches are excavated deeper than required, backfill until trench bottom is proper depth with properly compacted native material.
      d. Pipe 4 Inches In Diameter Or Larger -
         1) Grade bottom of trenches to provide uniform bearing and support for each section of pipe on undisturbed soil at every point along its length.
         2) Except where rock is encountered, take care not to excavate below depths indicated.
            a) Where rock excavations are required, excavate rock with minimum over-depth of 4 inches below required trench depths.
            b) Backfill over-depths in rock excavation and unauthorized over-depths with loose, granular, moist earth, thoroughly compacted.
         3) Whenever wet or unstable soil incapable of properly supporting pipe, as determined by Architect, occurs in bottom of trench, remove soil to depth required and backfill trench to proper grade with coarse sand, fine gravel, or other suitable material acceptable to Architect.
   4. If unusual excavating conditions are encountered, stop work and notify Architect.

B. Fill / Backfill
   1. General -
      a. Around Buildings And Structures - Slope grade away from building as specified in Section 02312. Hand backfill when close to building or where damage to building might result.
      b. Site Utilities -
         1) In Landscape Areas - Use backfill consisting of on-site soil.
         2) Under Pavement And Concrete Site Elements - Extend excavatable slurry fill / backfill to elevation of subgrade. Do not place base material until excavatable slurry fill / backfill has cured 72 hours.
      c. Do not use puddling or jetting to consolidate fill areas.
   2. Compacting -
      a. Fill / Backfill And Base -

1) Under Building Slabs or Pads, Driveways, And 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.
2) Under Concrete Site Elements And 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.
3) Utility Trenches -
   a) Site - Place fill in 12 inch layers and moisture condition to plus or minus 2 percent of optimum moisture content. Compact fill to 90 percent minimum relative compaction to within 12 inches of finish grade. Compact fill above 12 inches to 85 percent relative compaction
   b) Under Slabs - Place fill in 6 inch layers, moisture condition to plus or minus 2 percent of optimum moisture content, and compact to 95 percent minimum relative compaction to within 4 inches of finish grade. Final 4 inches of fill shall be granular base as specified in Section 02316.
4) Fill Slopes - Compact by rolling or using sheepsfoot roller.
5) Backfill Under Footings - Not allowed.
6) Other Backfills - Place other fills in 12 inch layers and compact to 90 percent relative compaction.

b. Engineered Fill -
   1)

3.4 REPAIR / RESTORATION

A. Repair damage to other portions of the Work resulting from work of this Section at no additional cost to Owner. On new work, arrange for damage to be repaired by original installer.

3.5 CLEANING

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

END OF SECTION

SECTION 31 2500

EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Provide permanent erosion and sedimentation controls as described in Contract Documents.

B. Related Requirements:
   1. Section 01 5700: Temporary Erosion and Sedimentation Control.
   2. Section 02 4113: Selective Site Demolition.
   3. Section 31 0501: Common Earthwork Requirements.
   4. Section 31 1100: Clearing and Grubbing.
   5. Section 31 1413: Topsoil Stripping And Stockpiling.
   6. Section 32 9300: Sections under heading.

1.2 REFERENCES

A. References:
   1. United States Environmental Protection Agency:
      a. EPA Document 832/R-92-005 (Sep 1992), 'Storm Water Management for Construction Activities.'
      b. Storm Water Pollution Prevention Plan prepared for the City of Herculaneum and Missouri Department of Natural Resources.

1.3 SUBMITTALS

A. Informational Submittals:
   1. Delegated Design Submittals:
      a. Sediment and erosion control plan, specific to site, meeting following objectives:
         1) Prevent loss of soil, including soil stockpiled for reuse, by storm water runoff and wind erosion.
         2) Prevent sedimentation of storm sewers and receiving streams.
         3) Prevent air pollution by dust and particulate matter.

1.4 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:
   1. Sediment and erosion control shall conform to EPA Document 832/R-92-005, Chapter 3, or local erosion and sedimentation control standards, whichever is more stringent.

B. Qualifications:
   1. Supervisor of erosion control operations shall be thoroughly familiar with types of erosion control materials being installed and best methods for their installation. Supervisor shall be present when work of this Section is being performed and shall direct work performed under this Section.

PART 2 - PRODUCTS

2.1 SYSTEM

A. Performance:
1. Design Criteria: Protect and maintain areas disturbed by the Work, so erosion is adequately controlled and silt and sediments are not allowed to flow into any watercourse, onto adjacent properties, or into storm drains.

B. Materials:
1. Hay And Straw Mulch:
   a. General:
      1) Reasonably free from swamp grass, weeds, twigs, debris and other deleterious materials, and free from rot, mold, primary noxious weed seeds, and rough or woody materials.
      2) Mulches containing mature seed of species which would volunteer and be detrimental to permanent seeding, or would result in over-seeding, or would produce growth which is aesthetically unpleasing, is not permitted.
   b. Hay Mulch:
      1) Properly aired native hay, Sudan grass hay, broom sedge hay, legume hay, or similar hay or grass mowings.
      2) Apply at 2 to 3 tons per acre unnetted or stabilized, or at 1.5 tons per acre when net or mulch stabilizer is used. When air-dried and in loose state, contents of representative bale shall lose not more than 15 percent of resulting air-dry weight of bale.
   c. Straw Mulch:
      1) Threshed plant residue of oats, wheat, barley, rye, or rice from which grain has been removed.
      2) Apply at 2 to 3 tons per acre unnetted or stabilized, or at 1.5 tons per acre when net or mulch stabilizer is used.
   d. Matting:
      1) Jute Matting:
         a) Undyed and unbleached jute yarn woven into uniform open, plain weave mesh and furnished in rolled strips. Matting shall conform to following physical requirements:
         b) 48 inch wide, plus or minus one inch.
         c) 78 warp ends per width of cloth.
         d) 41 weft ends per yard.
         e) 1.22 lbs to 1.80 lbs per lineal yard, plus or minus 5 percent.
   e. Excelsior Matting:
      1) Uniform web of interlocking wood excelsior fibers with a backing of mulch net fabric on one side only and furnished in rolled strips. Mulch net shall be woven of either twisted paper or cotton cord. Matting shall conform to following physical requirements:
         a) 36 inches wide, plus or minus one inch.
         b) 0.8 lbs per sq yd, plus or minus 5 percent.
   f. Soil Erosion Matting:
      1) Type Two Acceptable Products.
         a) 'Enkamat Type 7020' by American Enka Company.
         b) Equal as approved by Architect before use. See Section 01 6200.
   g. Erosion Control Mulching Blanket:
      1) Type Two Acceptable Products.
         a) 'Hold/Gro' by Gulf States Paper Corp.
         b) Equal as approved by Architect before use. See Section 01 6200.
2. Seed And Sod For Erosion Control:
   a. For Temporary Control: Annual or perennial ryegrass.
   b. For Permanent Control: See Sections under 32 9300 heading.
3. Hay Bales For Erosion Control:
   a. Rectangular shaped bales of hay or straw, weighing at least 40 lbs per bale, free from primary noxious weed seeds and rough or woody materials.
4. Silt Fences:

a. Type Two Acceptable Products
   1) 'Geofab Silt Fence' by Mercantile Development Inc.
   2) 'Mirafi 100X by Celanese Fibers Marketing Co.
   3) Equal as approved by Architect before use. See Section 01 6200.

2.2 ACCESSORIES

A. For Mulch:
   1. Mulch Stabilizers:
      a. Type Two Acceptable Products
         1) 'Curasol' applied at 40 gallons per acre .
         2) Dow 'Mulch Binder' applied at 45 gallons per acre.
         3) Asphalt binder meeting requirements of AASHTO M140, Type SS-1 or RS-1 as applicable and applied at 400 gallons per acre.
         4) Equal as approved by Architect before use. See Section 01 6200.
   2. Temporary Type Mulch Nets: Paper yarn, approximately 0.05 inches in diameter, woven into net with openings of approximately 7/8 inch by 1/2 inch and weight of approximately 0.2 lbs per sq yd.
   3. Permanent Type Mulch Nets:
      a. Type Two Acceptable Products:
         1) 'Vexar' or 'Erosion-Net' plastic or nylon mesh netting with openings of approximately 3/8 inch to 3/4 inch.
         2) Equal as approved by Architect before use. See Section 01 6200.

B. For Matting / Blankets:
   1. Staples: 11 ga minimum plain iron wire, made from 12 inch minimum lengths of wire bent to form 'U' of 1-1/2 inches to 2 inches in width with equal legs of 5 inch to 5-1/4 inches. Use longer staples for loose soils or where otherwise required.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
   1. Take every reasonable precaution to avoid erosion and to prevent silting of rivers, streams, lakes, reservoirs, impoundments, and drainage ditches and swales.
   2. Keep exposure of uncompleted cut slopes, embankments, trench excavations, and site graded areas as short as possible. Initiate seeding and other erosion control measures on each segment as soon as reasonably possible.
   3. Should it become necessary to suspend construction for any length of time, shape excavated and graded areas so runoff will be intercepted and diverted to points where minimal erosion will occur. Provide and maintain temporary erosion and sediment control measures, such as berms, dikes, slope drains, silt stops, and sedimentation basins, until permanent drainage facilities or erosion control features have been completed and are operative.
   4. Handle and treat fine material placed or exposed during The Work so as to minimize possibility of it reaching surface waters. Use diversion channels, dikes, sediment traps, or other effective control measures.
   5. Provide silt stops wherever erosion control measures may not be totally capable of controlling erosion, such as in drainage channels and where steep slopes may exist.
   6. Before water is allowed to flow in any ditch, swale, or channel, install permanent erosion control measures in waterway so waterway will be safe against erosion.
   7. Take precautions in using construction equipment to minimize erosion. Do not leave wheel tracks where erosion might begin.
   8. Unless specifically required in Contract Documents, operation of mechanized equipment in watercourses is not permitted. Where work is required in watercourses, minimize movement of

equipment in the water and remove false work, pilings, debris, and other temporary work as soon as construction will allow.

9. Wherever crossings of live streams are necessary, provide temporary culverts or bridges to allow equipment to cross them without fording. Disturbance of lands and waters outside limits of construction is prohibited, except as may be found necessary and approved in writing by Architect.
10. Mulching shall follow seeding operations by no more than 24 hours.
11. Continue erosion control measures until permanent measures have been sufficiently established and are capable of controlling erosion on their own.

B. Hay And Straw Mulching:
   1. Install hay or straw mulch immediately after areas have been properly prepared.
      a. When permanent seed or seed for temporary erosion control is sown prior to placing mulch, place mulch on seeded areas within 24 hours after seeding.
      b. Architect may authorize blowing of chopped mulch provided that 95 percent of mulch fibers will be 6 inches or more in length and that mulch can be applied in so there will be a minimum amount of matting that would retard plant growth.
      c. Hay mulch should cover ground enough to shade it, but should not be so thick that a person standing cannot see ground through mulch.
      d. Remove matted mulch or branches.
   2. Where mild winds that may blow mulch are probable, when ground slopes exceed 15 percent, or when otherwise required to maintain mulch firmly in place, apply a system of pegs and strings, a chemical stabilizer, or temporary type netting to mulch. Unless otherwise directed, remove strings and netting prior to acceptance of the Work.
   3. Where high winds or heavy rainstorms are likely, where ground surfaces are steeper than 15 percent, or where other conditions require, apply temporary type netting over mulch and take whatever other measures are necessary to maintain mulch firmly in place.
   4. Unless otherwise specified, use of permanent type netting is not permitted without prior written approval of Architect.

C. Matting:
   1. General:
      a. Use of mulch with matting is not permitted. However, 4 to 6 inch overlap of mulch over edge of matting is allowed.
      b. Prepare surfaces of ditches and slopes to conform to grades, contours, and cross sections shown on Drawings. Finish to smooth, even condition with debris, roots, stone, and lumps raked out and removed. Loosen soil surface sufficient to permit bedding of matting. Unless otherwise noted, place seed prior to placement of matting.
      c. Unroll matting parallel to direction of water flow and loosely drape, without folds or stretching, so continuous ground contact is maintained.
      d. In ditches and swales and on slopes, place each upslope and each downslope end of each piece of matting in 6 inch trench, stapled at 12 inches on center, backfilled, and tamped. Similarly, bury edges of matting along edges of catch basins and other structures. Architect may require that other edges exposed to more than normal flow of water be buried in similar fashion.
      e. Tightly secure matting to soil with staples driven approximately vertically into ground, flush with matting surface. Do not form depressions or bulges in matting surface with staples.
      f. Increase specified spacing of staples when factors such as season of year or amount of water encountered or anticipated require additional anchoring.
   2. Jute Matting:
      a. Where strips are laid parallel or meet, as in a tee, overlap 4 inches minimum. Overlap ends 6 inches minimum, shingle fashion.
      b. Space check slots built at right angles to direction of water flow so one check slot or one end occurs within each 50 feet of slope length. Construct check slots by placing tight fold of matting 6 inches minimum vertically into ground. Tamp these same as upslope ends.
      c. Press jute matting onto ground with light lawn roller or other satisfactory means.
      d. On slopes flatter than 4:1, place staples 36 inches apart maximum in three rows for each strip, with one row along each edge and one row alternately spaced down center. On grades 4:1 or steeper, place staples in the same three rows, but spaced 24 inches apart. On lapping edges, reduce spacing of staples by half. At ends of matting and at required check

slots, space staples 12 inches apart. Staple matting placed adjacent to boulders or other obstructions with no spaces between staples.

e. Spread additional seed over jute matting, particularly those locations disturbed by building of slots.

3. Excelsior Matting:
   a. Where strips of excelsior matting are laid end-to-end, butt adjoining ends.
   b. When adjoining rolls of excelsior matting are laid parallel to one another, butt matting snugly.
   c. On slopes flatter than 4:1, place staples 36 inches maximum apart in three rows for each strip, with one row along each edge and one row alternately spaced down center. On grades 4:1 or steeper, place staples in same three rows, but spaced 24 inches apart. Space staples in ends of matting 12 inches apart. Staple matting placed adjacent to boulders or other obstructions with no spaces between staples.
4. Erosion Control Mulching Blanket:
   a. Where one roll ends and second roll begins, bring end of upslope piece over end of downslope roll so there is 12 inch overlap. Place overlap in 4 inch deep trench, staple at 12 inches on center, and backfill and tamp.
   b. On slopes where two or more widths of blanket are applied, overlap edges 4 inches and staple at 12 inch intervals along exposed edge of lap joint.
   c. Staple body of blanket in grid pattern with staples 36 inches on center, each way.

D. Seed For Erosion Control:
1. Seeding for permanent erosion control shall be carried out in accordance with appropriate Section under 32 9300 heading.
2. Areas that will be regraded or otherwise disturbed later during construction may be seeded with rye grass to obtain temporary control. Sow seed at one lb per 1,000 sq ft, on pure live seed basis.

E. Hay Bales And Silt Fences:
1. Provide hay bales or silt fences, as required, for temporary control of erosion and to stop silt and sediment from reaching surface waters, adjacent properties, or entering catch basins, or damaging the Work.
2. Stake hay bales firmly in place. Use sufficient number of bales to accommodate runoff without causing flooding and to adequately store any silt, sediment, and debris reaching them.
3. Erect silt fences and bury bottom edge in accordance with Manufacturer's recommended installation instructions. Provide sufficient length of fence to accommodate runoff without causing flooding and to adequately store any silt, sediment, and debris reaching it.

3.2 REPAIR / RESTORATION

A. If any staple becomes loosened or raised, if any matting becomes loose, torn, or undermined, or if any temporary erosion and sediment control measures are disturbed, repair them immediately.

B. If seed is washed out before germination, repair damage, refertilize, and reseed.

C. Maintain mulched and matted areas, silt stops, and other temporary control measures until permanent control measures are established and no further erosion is likely.

END OF SECTION

SECTION 02316

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 vapor retarder and seam tape.

C. Related Sections
   1. Section 02051 - General Site Construction Requirements
   2. Section 02742 - Base course under asphalt concrete paving
   3. Section 02753 - Base course under Portland cement concrete paving
   4. Section 02776 - Granular base under concrete site elements
   5. Section 07261 - Furnishing of vapor retarder and seam tape

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM E 1643-98, 'Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs'

1.3 SEQUENCING

A. Install vapor retarder and granular base system after application of termite control and before placing concrete. If termite control is disturbed or receives precipitation before being covered with vapor retarder, re-apply termite control.

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 vapor retarder in accordance with ASTM E 1643 and following instructions.
   1. Install vapor retarder over compacted subgrade and tops of interior stem walls so entire area under slab is covered.
   2. Lap joints 3 inches minimum and seal with specified seam tape.
   3. Seal vapor retarder around pipes, conduits, and other utility items which penetrate vapor retarder using factory-fabricated boot installed as recommended by Manufacturer.
   4. Except for punctures required for reinforcing and anchor bolts at top of stem walls, seal tears and punctures before placing granular base.

B. Place 4 inches minimum of granular base over vapor retarder, level, and compact with two passes of 2-1/2 ton minimum roller.

C. Do not allow water onto vapor retarder or granular base before placing concrete.

3.2 FIELD QUALITY CONTROL

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

END OF SECTION

SECTION 02517

WATER SUPPLY / COPPER

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 for potable water supply from water main to within 5 feet of building as described in Contract Documents complete with meter, shut-off valve, and connections.
   2. Furnish and install piping from water main to meter inside of building as described in Contract Documents complete with shut-off valve and connections.

B. Related Sections
   1. Section 02051 - General Site Construction Requirements
   2. Section 02315 - Procedure and quality of excavating, backfilling, and 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 88-99, 'Standard Specification for Seamless Copper Water Tube'

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 -
         1) Stay-Silv white brazing flux by J W Harris Co, Cincinnati, OH (800) 733-4533 or (513) 891-2000 www.jwharris.com
         2) High quality silver solder flux by Handy & Harmon, Fairfield, CT (800) 245-2728 or (203) 259-8321 www.handyharmon.com

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.
   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.
6. Excavate trenches so outside pipe will be 12 inches minimum below frost line or 24 inches minimum below finish grade, whichever is deeper.
7. Backfill only after pipe lines have been tested and 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 And 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 02535

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.

B. Related Sections
   1. Section 02051 - General Site Construction Requirements
   2. Section 02315 - Procedure and quality of excavating, backfilling, and compacting.
   3. Section 15150 - Sanitary sewage system within building and within 5 feet of building.

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM A 74-98, 'Standard Specification for Cast Iron Soil Pipe and Fittings'
   2. ASTM C 564-97, 'Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings'
   3. ASTM D 2235-96a, 'Standard Specification for Solvent Cement for Acrylonitrille-Butadiene-Styrene (ABS) Plastic Pipe and Fittings'
   4. ASTM D 2321-00, 'Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications'
   5. ASTM D 2564-96a, 'Standard Specification for Solvent Cements for Poly (Vinyl Chloride)(PVC) Plastic Piping Systems'
   6. ASTM D 2661-97a, 'Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings'
   7. ASTM D 2665-00, 'Standard Specification for Poly (Vinyl Chloride)(PVC) Plastic Drain, Waste, and Vent Pipe Fittings'
   8. ASTM D 3034-00, 'Standard Specification for Type PSM Poly Vinyl Chloride)(PVC) Sewer Pipe and Fittings'
   9. ASTM F 656-96a, 'Standard Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride)(PVC) Plastic Pipe and Fittings'
   10. ASTM F 789-95a, 'Standard Specification for Type PSM 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 And Fittings
   1. Meet requirements of ASTM A 74, Service Grade.
      a. Cast iron for bell and spigot fittings
      b. Cast iron for no-hub joints.
   2. Approved Joint Material And Manufacturers -
      a. For Bell And Spigot Pipe - Rubber gaskets meeting requirements of ASTM C 564 and compatible with pipe used.

b. For No-Hub Pipe -
   1) Approved Products -
      a) Neoprene gaskets with type 304 stainless steel clamp and 24 ga type 304 stainless steel housing by Clamp-All Corp, Haverhill, MA (800) 762-7255 or (978) 372-9010 www.clampall.com
      b) SuperGrip 304 by AB&I - American Brass & Iron, Oakland, CA (800) 468-4766 or (510) 632-3467 www.abifoundry,com
      c) Husky SD 4000 coupling by ANACO, Anaheim, CA (707) 259-0602
      d) MG Coupling by MG Piping Products Co, Stanton, CA (800) 761-8055 or (714) 761-8055 www.mgcoupling.com

B. ABS Schedule 40 solid wall plastic pipe and fittings meeting requirements of ASTM D 2661 joined with pipe cement meeting requirements of ASTM 2235.

C. PVC Schedule 40 solid wall plastic pipe and fittings meeting requirements of ASTM D 2665 joined using cement primer meeting requirements of ASTM F 656 and pipe cement meeting requirements of ASTM D 2564.

2.2 MANUFACTURERS

A. Ipex Inc, Englewood, CO (866) 473-9462 www.ipexinc.com

PART 3 EXECUTION

3.1 EXAMINATION

A. Before installation, inspect pipe for defects and cracks. Do not use defective, damaged, or unsound pipe.

3.2 PREPARATION

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.
   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.
   6. Excavate trenches so outside pipe will be 12 inches minimum below frost line or 18 inches minimum below finish grade, whichever is deeper.

3.3 INSTALLATION

A. General
   1. When work is not in progress, close open ends of pipe and fittings so no trench water, soil, or other substances will enter pipes or fittings.
   2. Keep trenches free from water until pipe jointing material has set. Do not lay pipe when condition of trench or weather is unsuitable for such work.
   3. 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.

B. Placing And Laying of Underground Pipe
   1. Deflections from straight line or grade, as required by vertical curves, horizontal curves, or offsets, shall not exceed 6/D inches per linear foot of pipe where D represents nominal diameter of pipe expressed in inches
   2. Deflections to be determined between center lines extended of two connecting pipes.

3. If alignment requires deflection in excess of these limitations, provide special bends or sufficient number of shorter lengths of pipe to provide angular deflections within limits approved by Architect.
4. Laying -
   a. Pipe laying shall proceed up-grade with spigot ends of bell-and-spigot pipe pointing in direction of flow.
   b. Lay each pipe true to line and grade and in such manner as to form close concentric joint with adjoining pipe and to prevent sudden offsets of flow line.
   c. As work progresses, clear interior of pipe of dirt and superfluous materials. Where cleaning after laying is difficult because of small pipe, keep suitable swab or drag in pipe and pull forward past each joint immediately after jointing has been completed.
5. Make joints between cast iron pipe and other types of pipe with standard manufactured cast-iron adapters and fittings.
6. Valve, plug, or cap, as directed by Architect, where pipe ends are left for future connections.

B. Cast Iron Pipe And Fittings
1. Shape trench bottom to give substantially uniform circumferential support to lower third of each pipe. Provide depression under bell of each joint to maintain even bearing of sewer pipe.
2. Connect to street main as required by local authorities.
3. Use jacks to make-up gasketed joints.

C. Thermoplastic Pipe And 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 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.
6. Piping and joints shall be clean and installed according to Manufacturer's recommendations. Break down contaminated joints, clean seats and gaskets and reinstall.
7. Do not use 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 allowing vehicular traffic over pipe
   b. 48 inches before use of compaction equipment other than hand or impact tampers.

3.4 FIELD QUALITY CONTROL

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

END OF SECTION

SECTION 02630

STORM DRAINAGE

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 storm drainage system as described in Contract Documents from point of water collection to terminating point.

B. Related Sections
   1. Section 02051 - General Site Construction Requirements
   2. Section 02315 - Procedure and quality of excavating, backfilling, and compacting

1.2 REFERENCES

A. American Association Of State Highway And Transportation Officials
   1. AASHTO M-252, 4 to 10 inch pipe, 'Specifications for Corrugated Polyethylene Pipe'
   2. AASHTO M-294, 12 to 48 inch pipe, 'Specifications for Corrugated Polyethylene Pipe'

B. American Society For Testing And Materials
   1. ASTM A 74-98, 'Standard Specification for Cast Iron Soil Pipe and Fittings'
   2. ASTM A 536-84 (99), ' Standard Specification for Ductile Iron Castings'
   3. ASTM A 929-97, 'Standard Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe.
   3. ASTM C 14-99, 'Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe'
   4. ASTM C 76-00, 'Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe'
   5. ASTM C 564-97, 'Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings'
   6. ASTM D 2321-00, 'Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications'
   7. ASTM D 3034-00, 'Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings'
   9. ASTM D 3212-96a, 'Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals'
   10. ASTM F 794-99, 'Standard Specification for Poly(Vinyl Chloride)(PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter'
   11. ASTM F 1336-00, 'Standard Specification for Poly(Vinyl Chloride)(PVC) Gasketed Sewer Fittings'

PART 2 PRODUCTS

2.1 MATERIAL

A. Bedding Material - 3/8 inch crushed gravel.

2.2 COMPONENTS

A. Catch Basins, Curb Inlets, Etc
   1. Concrete -
      a. Construct of 4000 psi minimum concrete.
      b. Include cover inlet with cast iron frame and grate as shown on Drawings.
   2. PVC -
      a. Comply with requirements of ASTM D 3212. ASTM F 794, and ASTM F 1336.
      b. Metal grates, Frames, and hoods shall comply with ASTM A 536, Grade 70-50-05.

c. Acceptable Products -
   1) Nyloplast-ADS, Buford, GA (866) 888-8479 www.nyloplast-us.com
   2) Equal as approved by Architect before bidding. See Section 01600.

B. Concrete Pipe
   1. Non-Reinforced - Meet requirements of ASTM C 14.
   2. Reinforced -
      a. Meet requirements of ASTM C 76, plain end.
      b. Determine class of pipe by depth of cover over pipe at rough-graded elevations as follows -

Depth Of Cover	Class Of Pipe
Under 2 feet	V
2 feet to 3 feet	IV
3 feet to 6 feet	III
Over 6 feet	II

C. PVC Pipe And Fittings
   1. Meet requirements of ASTM D 3034, SDR 35
   2. Fittings - Slip Joint type with elastomeric seals.

D. Corrugated Polyethylene Pipe And Fittings
   1. Meet requirements of AASHTO M-252 or M-294, Type S.
      a. Corrugated, helical or annular, exterior with smooth interior and gasketed connectors.
      b. Corrugated, annular, with silt and water tight joints for storm sewers.

E. Corrugated Metal Pipe
   1. Meet requirements of ASTM A 929.
   2. 16 gauge, standard round, galvanized with 2 ounces zinc per square foot sheet steel.
   3. Corrugations -
      a. 6 to 10 Inch Pipe - 1-1/2 by 1/4 inch depth helical corrugations.
      b. 12 to 60 Inch Pipe - 2-2/3 by 1/2 inch depth helical corrugations.

F. Cast Iron Soil Pipe And Fittings
   1. Meet requirements of ASTM A 74.
   2. Joint Material - Rubber gaskets meeting requirements of ASTM C 564 and compatible with pipe used.

PART 3 EXECUTION

3.1 PREPARATION

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.
   3. Grade to obtain fall required.
   4. Remove debris from trench prior to laying of bedding and pipe.
   5. Do not cut trenches near footings without consulting Architect.
   6. Backfill only after pipe lines have been tested, inspected, and approved by Architect.

3.2 INSTALLATION

A. Concrete Pipe
   1. Provide 3 inches of uncompacted bedding material below pipe.
   2. After installation of pipe, provide additional bedding material up to springline of pipe.

B. PVC / Polyethylene Pipe
   1. Install in accordance with ASTM D 2321.
   2. Minimum cover for corrugated polyethylene pipe and fittings shall be 12 inches for H-20 load.

C. Use jacks to make-up gasketed joints.

3.3 FIELD QUALITY CONTROL

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

3.4 CLEANING

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

END OF SECTION

SECTION 02742

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 and asphaltic concrete paving in driveways and parking areas as described in Contract Documents

B. Related Sections
   1. Section 02051 - General Site Construction Requirements
   2. Section 02315 - Compaction procedures and tolerances

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM C 131-96, 'Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine'
   2. ASTM D 977-98, 'Standard Specification for Emulsified Asphalt'
   3. ASTM D 1075-96 (2000), 'Standard Test Method for the Effect of Water on Compressive Strength of Compacted Bituminous Mixtures'
   4. ASTM D 1188-96, 'Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens'
   5. ASTM D 1559-89, 'Standard Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus'
   6. ASTM D 2027-97, 'Standard Specification for Cutback Asphalt (Medium-Curing Type)'
   7. ASTM D 2041-00, 'Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures'
   8. ASTM D 2397-98, 'Standard Specification for Cationic-Emulsified Asphalt'
   9. ASTM D 2726-00, 'Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens'
   10. ASTM D 3381-92 (1999), 'Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction'

1.3 SUBMITTALS

A. Product Data - Manufacturer's published product data on pre-emergent herbicide.

B. Quality Assurance / Control
   1. Mix design of asphalt concrete mixture.
   2. Copies of test results from tests conducted to assure compliance to Contract Document requirements.
   3. Manufacturer's application instructions for pre-emergent herbicide.

1.4 QUALITY ASSURANCE

A. Qualifications - Pre-emergent herbicide shall be applied by applicator certified by State in which Project is located as an applicator of agricultural chemicals.

B. Pre-Installation Conferences
   1. Participate in pre-installation conference specified in Section 02311.

2. Schedule paving pre-installation conference after staking of parking areas and installation of sleeves, but before installation of base and paving.

1.5 PROJECT CONDITIONS

A. Environmental Requirements
   1. Do not perform work during following conditions -
      a. Ambient temperature or temperature of base 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. Pre-emergent herbicide
   1. Selective type pre-emergence control chemical containing 60 percent Trifluralin minimum.
   2. Labeled for under-pavement use.
   3. Acceptable Products -
      a. Treflan or Spike 80W by Dow AgroSciences, Indianapolis, IN (800) 905-7326 or (317) 337-3000 www.dowagro.com
      b. Trust 4EC by Agriliance LLC, St Paul, MN (800) 535-4635 or (651) 451-5000
      c. Equal as approved by Architect before installation. See Section 01600.

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

Sieve	Percent by Weight Passing Sieve
1 inch	100
3/4 inch	85 - 100
No. 4	45 - 60
No. 10	30 - 50
No. 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 Inch	100
1-1/2 inch	85 - 100
3/4 inch	60 - 80
No. 4	30 - 50
No. 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 inch	100
1/2 inch	95 - 100
3/8 inch	80 - 95
No. 4	54 - 71
No. 8	38 - 54
No. 30	17 - 32
No. 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. (50 blow count Marshall)
   2. Final design shall meet following criteria -
      a. Stability - 1200 pounds minimum
      b. Flow - 8 minimum, 18 maximum
      c. Air voids - 2 percent minimum, 4 percent maximum
      d. Voids in mineral aggregate - 15 percent minimum
      e. Asphalt cement by weight of total - 5 percent minimum
      f. Dry Strength - 200 psi
      g. Index of Retained Strength - 75 percent

PART 3 EXECUTION

3.1 APPROVED INSTALLERS

A. Approved Applicators
   1.
   2.
   3.
   1. Paving companies shall be pre-approved and included in Construction Documents by Addendum.

3.2 PREPARATION

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

B. Sub-Grade
   1. Fine grade parking surface area to grades required by Contract Documents.
   2. Compact sub-grade as specified in Section 02315.

C. Pre-emergent Herbicide
   1. Apply to prepared subgrade dispersed in liquid. Concentrate shall be such that Manufacturer's full recommended rate of chemical will be applied to every 1000 sq ft and liquid will penetrate a minimum of 2 inches.

2. Application shall be no more than one day before installation of base.
3. Take necessary precautions to protect adjoining property and areas designated for planting on building site.

3.3 INSTALLATION

A. Site Tolerances
   1. Sub-Grade - 0.00 inches high. Measure using string line from curb to curb, gutter, flat drainage structure, or grade break.
   2. Base -
      a. Base shall be 6 inches thick minimum 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. Apply asphaltic concrete paving in single lift 3 inches thick minimum after compaction, except where shown thicker on Drawings. Paving thicker than 3 inches may be applied in two lifts, the first 2 inches thick minimum and the second 1-1/2 inches thick minimum.
      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. Base
   1. If roller is smaller than 8 ton, lay gravel and compact in two courses.
   2. Compact as specified in Section 02315.
   3. Priming - Prime base with application of 0.2 to 0.5 gallons of asphalt cement primer per square yard if pavement will be laid more than three days after compaction of base, or if precipitation is anticipated between completion of compaction of base and laying of pavement.
   4. Recompact unprimed base if it receives precipitation before pavement is laid.
   5. Remove or repair improperly prepared areas as directed by Architect.

C. Asphaltic Concrete Paving
   1. Tack coat vertical concrete surfaces that will be in contact with paving.
   2. Uniformly mix materials so aggregate is thoroughly coated with asphalt.
   3. Place at temperatures between 250 and 325 deg F with a self-propelled laydown machine.
   4. Longitudinal bituminous joints shall be vertical and properly tack coated if cold. Transverse joints shall always be tack coated.
   5. Compaction -
      a. Compact asphaltic concrete paving to 96 percent minimum. Determine percent compaction by dividing density of test cores as determined by either ASTM D 1188 or ASTM D 2726 by laboratory compacted density as determined by ASTM D 1559. Maximum total air voids in completed asphaltic concrete shall be 8 percent as determined by ASTM D 2041.
      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.
   6. Surface shall be uniform with no 'birdbaths'. Leave finished surfaces clean and smooth. Variations from specified grades shall not exceed 1/2 inch.

3.4 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 02776

CAST-IN-PLACE CONCRETE SITE ELEMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Compact sub-base for cast-in-place concrete site elements as described in Contract Documents.
   2. Furnish and install granular base for cast-in-place concrete site elements as described in Contract Documents.
   3. Furnish and install cast-in-place concrete site elements as described in Contract Documents.
   4. Furnish and install sealants as described in Contract Documents.

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

C. Related Sections
   1. Section 02051 - General Site Construction Requirements
   2. Section 02315 - Compaction procedures and tolerances
   3. Section 02813 - Sleeves for underground irrigation system
   4. Section 05120 - Furnishing of pipe for pipe bollards
   6. Section 07920 - Quality of Sealants
   7. Section 10352 - Furnishing of flagpole base and foundation sleeve
   8. Section 16520 - Furnishing of lightpole base anchors

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM D 1751-99, 'Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)'

1.3 QUALITY ASSURANCE

A. Pre-Installation Conferences
   1. Participate in pre-installation conference specified in Section 02311.
   2. Schedule concrete site element pre-installation conference 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 03313.

PART 2 PRODUCTS

2.1 MATERIALS

A. Formwork - Meet requirements specified in Section 03120.

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

Sieve	Percent by Weight Passing Sieve
1 inch	100
3/4 inch	85 - 100
No. 4	45 - 60
No. 10	30 - 50
No. 200	5 - 10 (non-plastic)

C. Expansion Joints
   1. 1/2 inch thick.
   2. Manufactured commercial fiber type -
      a. Meet requirements of ASTM D 1751
      b. Acceptable Products -
         1) Conflex by Masonite Building & Industrial Products Group, Chicago, IL (800) 257-7885 www.masonite.com
         2) Sealtight by W R Meadows Inc, Hampshire, IL (800) 342-5976 www.meadows.com
         3) Equal as approved by Architect before installation.
   3. Recycled Vinyl -
      a. Light gray color
      b. Approved Products -
         1) Proflex by Oscoda Plastics Inc, Oscoda, MI (800) 544-9538 www.oscodaplastics.com

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

PART 3 EXECUTION

3.1 PREPARATION

A. Sub-Base - Compact sub-base as specified in Section 02315.

3.2 INSTALLATION

A. Granular Base - Except under mow strips, place 4 inches minimum of granular base, level, and compact as specified in Section 02315.

B. Joints
   1. Align joints of sidewalk and curb and gutter.
   2. Expansion And Contraction Joints -
      a. Spacing -
         1) Sidewalks And Curbs - 50 feet on center
         2) Mow Strips - 100 feet on center
         3) Flat Drainage Structures - 50 feet on center
         4) Retaining Walls -
            a) 36 feet on center at walls with guardrails
            b) 50 feet on center at walls with chain link fencing
      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
         3) Mow Strips - 5 feet on center
         4) Flat Drainage Structures - 10 feet on center
         5) Retaining Walls -
            a) 6 feet on center at walls with guardrails

b) 10 feet on center at walls with chain link fencing

b. Depth of control joints shall be approximately one quarter of concrete slab thickness, but not less than one inch.

C. Finish
1. Curb, Gutter, Sidewalks, Mow Strips, Flat Drainage Structures, Stairs, And Miscellaneous -
   a. Broom finish.
   b. Round edges including edges formed by expansion joints.
   c. Remove edger marks.
2. Light Pole And Flagpole Bases - Exposed portion to have rubbed finish.
3. Retaining Walls -
   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.

D. Special Requirements
1. Form vertical surfaces full depth. Do not allow concrete to flow out from under forms in any degree.
2. Sidewalks, Exterior Stairs, And Landings -
   a. Slope sidewalks with cross slope of 1/8 to 1/4 inch per ft in direction of intended drainage.
   b. Slope sidewalks away from building one percent minimum.
   c. Do not dust with cement.
3. Mow Strips -
   a. Granular base not necessary under mow strips. Compact subgrade under mow strip to density of undisturbed earth.
   b. Form and cast mow strips in place.
   c. Set top of mow strip 1-1/2 inches above finish grade.
   d. Compact topsoil underneath mow strip to density of undisturbed earth.
4. Light Pole Bases - Install bond breaker consisting of three layers of 30 lb roofing felt between pole base and adjoining sidewalk.
5. Pipe Bollards - Install plumb and fill with concrete.

3.3 FIELD QUALITY CONTROL

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

END OF SECTION

SECTION 03-0001

DIVISION 3 - CONCRETE

SEE SPECIFICATIONS, PLANS AND DETAILS ON STRUCTURAL ENGINEER'S DRAWING SHEETS.

SECTION 05-0001

DIVISION 5 - METALS

SECTION 05-5000

METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated steel items.

1.02 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2012.

B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.

C. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.

D. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.

E. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2010 w/Errata.

F. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings; 1999 (Ed. 2004).

G. SSPC-SP 2 - Hand Tool Cleaning; Society for Protective Coatings; 1982 (Ed. 2004).

1.03 SUBMITTALS

A. See Section 01-3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A36/A36M.

B. Plates: ASTM A283.

C. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.

D. Slotted Channel Framing: ASTM A653/A653M, Grade 33.

E. Slotted Channel Fittings: ASTM A1011/A1011M.

F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATED ITEMS

A. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.

2.03 FINISHES - STEEL

A. Prime paint all steel items.

B. Prepare surfaces to be primed in accordance with SSPC-SP2.

C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

D. Prime Painting: One coat.

2.04 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

A. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

A. Install bollards plumb and accurately fitted, free from distortion or defects. Field paint.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Perform field welding in accordance with AWS D1.1/D1.1M.

D. Obtain approval prior to site cutting or making adjustments not scheduled.

E. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

END OF SECTION

SECTION 06-0001

DIVISION 6 - WOOD, PLASTICS AND COMPOSITES

SECTION 06-1000

ROUGH CARPENTRY

PART 1 GENERAL

1.01 INTERIOR PARTITION FRAMING MAY BE OF WOOD OR METAL MEMBERS, AT THE CONTRACTOR'S DISCRETION.

A. Use only one method throughout entire project.

1.02 SECTION INCLUDES

A. Non-structural dimension lumber framing.

B. Rough opening framing for doors, windows, and roof openings.

C. Preservative treated wood materials.

D. Miscellaneous framing and sheathing.

E. Communications and electrical room mounting boards.

F. Concealed wood blocking, nailers, and supports.

1.03 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.

C. AWPA U1 - Use Category System: User Specification for Treated Wood; American Wood Protection Association; 2012.

D. PS 1 - Structural Plywood; 2009.

E. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology, Department of Commerce; 2010.

F. SPIB (GR) - Grading Rules; Southern Pine Inspection Bureau, Inc.; 2014.

1.04 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

1.05 WARRANTY

A. See Section 01-7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. Species: Southern Pine, unless otherwise indicated.
   2. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

B. Lumber fabricated from old growth timber is not permitted.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Grading Agency: Southern Pine Inspection Bureau, Inc. (SPIB).

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: S-dry or MC19.

D. Stud Framing (2 by 2 through 2 by 6):
   1. Grade: No. 2.

E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

2.03 EXPOSED DIMENSION LUMBER

A. Sizes: Nominal sizes as indicated on drawings.

B. Surfacing: S4S.

C. Moisture Content: S-dry or MC19.

2.04 CONSTRUCTION PANELS

A. Other Applications:
   1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
   2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
   3. Other Locations: PS 1, C-D Plugged or better.

2.05 ACCESSORIES

A. Fasteners and Anchors:
   1. Metal and Finish: Hot-dipped galvanized steel per ASTM A 153/A 153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
   2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.

B. Die-Stamped Connectors: Hot dipped galvanized steel, sized to suit framing conditions.
   1. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing per ASTM A653/A653M.

C. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.

D. Sill Flashing: As specified in Section 07-6200.

2.06 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
   1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Preservative Treatment:
   1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative to 0.25 lb/cu ft retention.
      a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
      b. Treat lumber exposed to weather.
      c. Treat lumber in contact with roofing, flashing, or waterproofing.
      d. Treat lumber in contact with masonry or concrete.

PART 3 EXECUTION

3.01 PREPARATION

A. Where wood framing bears on cementitious foundations, install full width sill flashing continuous over top of foundation, lap ends of flashing minimum of 4 inches and seal.

B. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.

C. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.

C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.

D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

F. Provide the following specific non-structural framing and blocking:
   1. Cabinets and shelf supports.
   2. Wall brackets.
   3. Handrails.
   4. Grab bars.
   5. Towel and bath accessories.
   6. Wall-mounted door stops.
   7. Chalkboards and marker boards.
   8. Wall paneling and trim.
   9. Joints of rigid wall coverings that occur between studs.

3.04 INSTALLATION OF CONSTRUCTION PANELS

3.05 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.

B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.06 CLEANING

A. Waste Disposal: Comply with the requirements of Section 01-7419.
   1. Comply with applicable regulations.
   2. Do not burn scrap on project site.
   3. Do not burn scraps that have been pressure treated.
   4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 07-0001

DIVISION 7 - THERMAL & MOISTURE PROTECTION

SECTION 07-1113

BITUMINOUS DAMPPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Bituminous dampproofing.

B. Protection boards.

1.02 REFERENCE STANDARDS

A. ASTM D1187/D1187M - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal; 1997 (Reapproved 2011).

B. ASTM D1227 - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing; 2013.

C. NRCA ML104 - The NRCA Roofing and Waterproofing; National Roofing Contractors Association; Fifth Edition, with interim updates.

1.03 SUBMITTALS

A. See Section 01-3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide properties of primer, bitumen, and mastics.

1.04 FIELD CONDITIONS

A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application until dampproofing has cured.

PART 2 PRODUCTS

2.01 DAMPPROOFING PRODUCTS

A. Bituminous Dampproofing: Cold-applied water-based emulsion; asphalt with mineral colloid or chemical emulsifying agent; with or without fiber reinforcement; asbestos-free; suitable for application on vertical and horizontal surfaces.

1. Composition - Vertical Application: ASTM D1227 Type III or ASTM D1187 Type I.
2. Composition - Horizontal and Low-Slope Application: ASTM D1227 Type II or III.
3. VOC Content: Not more than permitted by local, State, and federal regulations.
4. Applied Thickness: 1/16 inch, minimum, wet film.

B. Primers, Mastics, and Related Materials: Type as recommended by dampproofing manufacturer.

2.02 ACCESSORIES

A. Protection Board: Type recommended by waterproofing manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.

C. Verify that items that penetrate surfaces to receive dampproofing are securely installed.

3.02 PREPARATION

A. Protect adjacent surfaces not designated to receive dampproofing.

B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.

C. Do not apply dampproofing to surfaces unacceptable to manufacturer.

D. Apply mastic to seal penetrations, small cracks, or minor honeycomb in substrate.

3.03 APPLICATION

A. Foundation Walls: Apply two coats of asphalt dampproofing.

B. Perform work in accordance with NRCA Roofing and Waterproofing Manual.

C. Apply bitumen with roller.
D. Apply bitumen in two coats, continuous and uniform, at a rate of 25 sq ft/gal per coat.
E. Apply from 2 inches below finish grade elevation down to top of footings.
F. Seal items projecting through dampproofing surface with mastic. Seal watertight.
G. Immediately backfill against dampproofing to protect from damage.
H. Place protection board directly over dampproofing, butt joints, and adhere to tacky dampproofing.
I. Scribe and cut boards around projections, penetrations, and interruptions.

END OF SECTION

SECTION 07-4113

METAL ROOF PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Structural roofing system of preformed steel panels.

B. Fastening system.

C. Accessories and miscellaneous components.

1.02 REFERENCE STANDARDS

A. ASTM C1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus; 2011.

B. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference; 2005 (Reapproved 2012).

C. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01-3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
   1. Show work to be field-fabricated or field-assembled.

C. Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of available colors and patterns.

D. Test Reports: Indicate compliance of metal roofing system to specified requirements.

E. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

1.05 WARRANTY

A. See Section 01-7800 - Closeout Submittals, for additional warranty requirements.

B. Finish Warranty: Provide manufacturer’s special warranty covering failure of factory-applied exterior finish on metal roof panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant fading, chalking, cracking, or peeling within specified warranty period of 5 year period from date of Substantial Completion.

C. Waterproofing Warranty: Provide manufacturer’s warranty for weathertightness of roofing system, including agreement to repair or replace roofing that fails to keep out water within specified warranty period of 5 years from date of Substantial Completion.

1.06 ROOF PANELS TO BE PART OF THE METAL BUILDING PACKAGE; SEE ALSO SPECIFICATIONS SECTION 13-3420.

PART 2 PRODUCTS

2.01 STRUCTURAL METAL ROOF PANELS

A. Structural Metal Roofing: Provide complete roofing assemblies, including roof panels, clips, fasteners, connectors, and miscellaneous accessories, tested for conformance to the following minimum standards:
   1. Structural Design Criteria: Provide panel assemblies designed to safely support design loads at support spacing indicated, with deflection not to exceed 1/180 of the span when tested in accordance with ASTM E1592.
   2. Overall: Complete weathertight system tested and approved in accordance with ASTM E1592.
   3. Wind Uplift: Class 90 wind uplift resistance of UL 580.

4. Thermal Movement: Design system to accommodate without deformation anticipated thermal movement over ambient temperature range of 100 degrees F.
5. Thermal Performance: Provide thermal resistance through entire system (R-value) of 15 deg F hr sq ft/BTU; 2 inch thick, when tested in accordance with ASTM C1363.

B. Metal Panels: Factory-formed panels with factory-applied finish.
1. Type: Double skin, factory-assembled with foamed-in-place urethane insulation.
2. Steel Panels:
a. Steel Thickness: Minimum 0.024 inch.
3. Texture: Smooth.
4. Width: Maximum panel coverage of 16 inches.

2.02 ATTACHMENT SYSTEM

A. Concealed System: Provide manufacturer's standard stainless steel or nylon-coated aluminum concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

2.03 ACCESSORIES AND MISCELLANEOUS ITEMS

A. Miscellaneous Sheet Metal Items: Provide flashings, gutters, downspouts, trim, moldings, closure strips, and caps of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.
1. Downspouts: Open face, rectangular profile.

B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion resistant finish or combination steel and closed-cell foam.

C. Sealants: As specified in Section 07-9005.
1. Exposed sealant must cure to rubber-like consistency.
2. Concealed sealant must be non-hardening type.

D. Ice/Snow retainers: provide type as recommended by metal building manufacturer, and install at bottom of all downhill slopes, at a distance from the roof edge determined by the metal building manufacturer.

2.04 FABRICATION

A. Panels: Fabricate panels and accessory items at factory, using manufacturer’s standard processes as required to achieve specified appearance and performance requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation of preformed metal roof panels until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to assure that the completed roof will be free of leaks.

B. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by roof panel manufacturer.

C. Where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

3.03 INSTALLATION

A. Overall: Install roofing system in accordance with approved shop drawings and panel manufacturer's instructions and recommendations, as applicable to specific project conditions. Anchor all components of roofing system securely in place while allowing for thermal and structural movement.
1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
2. Minimize field cutting of panels. Where field cutting is absolutely required, use methods that will not distort panel profiles. Use of torches for field cutting is absolutely prohibited.

B. Accessories: Install all components required for a complete roofing assembly, including flashings, gutters, downspouts, trim, moldings, closure strips, caps, rib closures, ridge closures, and similar roof accessory items.

C. Roof Panels: Install panels in strict accordance with manufacturer's instructions, minimizing transverse joints except at junction with penetrations.

3.04 CLEANING

A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

END OF SECTION

SECTION 07-4213

METAL WALL PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manufactured metal panels for walls and soffits, with insulation, liners, related flashings, and accessory components.

1.02 SUBMITTALS

A. Shop Drawings: Indicate dimensions, layout, joints, construction details, methods of anchorage, and _____.

B. Samples: Submit two samples of wall panel and soffit panel, 12 inch by 12 inch in size illustrating finish color, sheen, and texture.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.

B. Store prefinished material off ground and protected from weather. Prevent twisting, bending, or abrasion, and provide ventilation to stored materials. Slope metal sheets to ensure drainage.

C. Prevent contact with materials that may cause discoloration or staining of products.

1.04 WARRANTY

A. See Section 01-7800 - Closeout Submittals, for additional warranty requirements.

1.05 WALL PANELS TO BE PART OF THE METAL BUILDING PACKAGE; SEE ALSO SPECIFICATIONS SECTION 13-3420.

PART 2 PRODUCTS

2.01 MANUFACTURED METAL PANELS

A. Wall Panel System: Factory fabricated prefinished metal panel system, site assembled.
   1. Provide exterior panels, interior liner panels, and soffit panels.
   2. Maximum Allowable Deflection of Panel: 1/90 of span.
   3. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement within system; movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
   4. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
   5. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
   6. Corners: Factory-fabricated in one continuous piece with minimum 18 inch returns.
   7. Exterior Panel Back Coating: Panel manufacturer's standard polyester wash coat.
   8. Interior Panel Finish: Panel manufacturer's standard polyester coating, top coat over recommended primer.

B. Exterior Panels:
   1. Profile: Vertical.
   2. Side Seams: Double-interlocked, tight-fitting, sealed with continuous gaskets.
   3. Color: As selected by Architect from manufacturer's standard line.

C. Liner Panels:
   1. Profile: Vertical; style as indicated.
   2. Side Seams: Lapped, sealed with continuous gaskets.
   3. Material: Precoated steel sheet, 18 gage, 0.0478 inch minimum thickness.

D. Soffit Panels:
   1. Profile: flush.
   2. Color: As selected by Architect from manufacturer's standard line.

E. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; shop cut and factory mitered to required angles.

F. Expansion Joints: Same material, thickness and finish as exterior sheets; ___ gage, ___ inch thick; manufacturer's standard brake formed type, of profile to suit system.

G. Trim: Same material, thickness and finish as exterior sheets; brake formed to required profiles.

H. Anchors: Galvanized steel.

2.02 ACCESSORIES

A. Gaskets: Manufacturer's standard type suitable for use with system, permanently resilient; ultraviolet and ozone resistant.

B. Sealants: Manufacturer's standard type suitable for use with installation of system; non-staining.

C. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, steel, hot dip galvanized. Fastener cap same color as exterior panel.
   1. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws.

D. Field Touch-up Paint: As recommended by panel manufacturer.

E. Bituminous Paint: Asphalt base.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that building framing members are ready to receive panels.

3.02 PREPARATION

A. Install subgirts perpendicular to panel length, securely fastened to substrates and shimmed and leveled to uniform plane. Space at intervals indicated.

3.03 INSTALLATION

A. Install panels on walls and soffits in accordance with manufacturer's instructions.

B. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint. Allow to dry prior to installation.

C. Fasten panels to structural supports; aligned, level, and plumb.

D. Locate joints over supports. Lap panel ends minimum 2 inches.

E. Provide expansion joints where indicated.

F. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

3.04 TOLERANCES

A. Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch.

B. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch.

3.05 CLEANING

A. Remove site cuttings from finish surfaces.

B. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.

END OF SECTION

SECTION 07-7123

MANUFACTURED GUTTERS AND DOWNSPOUTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pre-finished galvanized steel gutters and downspouts.

1.02 REFERENCE STANDARDS

A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 2013.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.

C. SMACNA (ASMM) - Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2012.

1.03 DESIGN REQUIREMENTS

A. Conform to SMACNA (ASMM) for sizing components for rainfall intensity determined by a storm occurrence of 1 in 5 years.

B. Conform to applicable code for size and method of rain water discharge.

1.04 SUBMITTALS

A. See Section 01-3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations, and installation details.

C. Samples: Submit two samples, 2 x 2 inch long illustrating component design, finish, color, and configuration.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope to drain.

B. Prevent contact with materials that could cause discoloration, staining, or damage.

PART 2 PRODUCTS

2.01 MATERIALS

A. Pre-Finished Galvanized Steel Sheet: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 0.02 inch thick base metal.
   1. Finish: Shop pre-coated with modified silicone coating.
   2. Color: As scheduled.

2.02 COMPONENTS

A. Gutters: SMACNA rectangular style profile.

B. Downspouts: SMACNA Rectangular profile.

C. Anchors and Supports: Profiled to suit gutters and downspouts.
   1. Anchoring Devices: In accordance with SMACNA requirements.
   2. Gutter Supports: Brackets.
   3. Downspout Supports: Brackets.

D. Fasteners: Galvanized steel, with soft neoprene washers.

2.03 ACCESSORIES

A. Splash Pads: Precast concrete type, size and profiles indicated; minimum 3000 psi at 28 days, with minimum 5 percent air entrainment.

B. Downspout Boots: Plastic.

2.04 FABRICATION

A. Form gutters and downspouts of profiles and size indicated.

B. Fabricate with required connection pieces.

C. Form sections square, true, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.

D. Hem exposed edges of metal.

E. Fabricate gutter and downspout accessories; seal watertight.

2.05 FACTORY FINISHING

A. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system; color as scheduled.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that surfaces are ready to receive work.

3.02 PREPARATION

A. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.

B. Sheet Metal: Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts and accessories.

C. Connect downspouts to downspout boots at min 4 inches above grade. Seal connection watertight.

D. Connect downspouts to storm sewer system. Grout connection watertight.

E. Set splash pans under downspouts. Secure in place with _____.

END OF SECTION

SECTION 07-9005

JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sealants and joint backing.

1.02 REFERENCE STANDARDS

A. ASTM C834 - Standard Specification for Latex Sealants; 2010.

B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.

D. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2005 (Reapproved 2010).

1.03 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.04 WARRANTY

A. See Section 01-7800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a one year period after Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Gunnable and Pourable Sealants:
   1. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
   2. Bostik Inc: www.bostik-us.com.
   3. Dow Corning Corporation: www.dowcorning.com.
   4. Pecora Corporation: www.pecora.com.
   5. Tremco Global Sealants: www.tremcosealants.com.
   6. Sherwin-Williams Company: www.sherwin-williams.com.
   7. W.R. Meadows, Inc: www.wrmeadows.com.

B. Preformed Compressible Foam Sealers:
   1. EMSEAL Joint Systems, Ltd: www.emseal.com.
   2. Tremco Global Sealants: www.tremcosealants.com.
   3. Substitutions: See Section 01-6000 - Product Requirements.

2.02 SEALANTS

A. General Purpose Exterior Sealant: Polyurethane; ASTM C920, Grade NS, Class 25 minimum; Uses M, G, and A; single component.
   1. Color: To be selected by Architect from manufacturer's standard range.
   2. Applications: Use for:
      a. Control, expansion, and soft joints in masonry.
      b. Joints between concrete and other materials.
      c. Joints between metal frames and other materials.
      d. Other exterior joints for which no other sealant is indicated.

B. Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, nondrying, nonskinning, noncuring.
   1. Applications: Use for:
      a. Concealed sealant bead in sheet metal work.
      b. Concealed sealant bead in siding overlaps.

C. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
   1. Color: Match adjacent finished surfaces.

2. Applications: Use for:
    a. Interior wall and ceiling control joints.
    b. Joints between door and window frames and wall surfaces.
    c. Other interior joints for which no other type of sealant is indicated.

D. Bathtub/Tile Sealant: White silicone; ASTM C920, Uses I, M and A; single component, mildew resistant.
1. Applications: Use for:
    a. Joints between plumbing fixtures and floor and wall surfaces.
    b. Joints between kitchen and bath countertops and wall surfaces.

E. Epoxy Concrete Floor Joint Filler: Self-leveling, pourable, semi-rigid sealant intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
1. Composition: Single or multi-part,100 percent solids by weight.
2. Hardness: 85, minimum, after 7 days, when tested in accordance with ASTM D2240, Shore A.
3. Color: Match adjacent finished surfaces.
4. Joint Width, Minimum: 1/8 inch.
5. Joint Width, Maximum: 1/4 inch.
6. Joint Depth: Provide product suitable for joints from 1/8 inch to 2 inches in depth including space for backer rod.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean and prime joints in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Protect elements surrounding the work of this section from damage or disfigurement.

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Measure joint dimensions and size joint backers to achieve the following, unless otherwise indicated:
1. Width/depth ratio of 2:1.
2. Neck dimension no greater than 1/3 of the joint width.
3. Surface bond area on each side not less than 75 percent of joint width.

D. Install bond breaker where joint backing is not used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

G. Tool joints concave.

H. Concrete Floor Joint Filler: Install concrete floor joint filler per manufacturer's written instructions. After floor joint filler is fully cured, shave joint filler flush with top of concrete slab.

3.04 CLEANING

A. Clean adjacent soiled surfaces.

3.05 PROTECTION

A. Protect sealants until cured.

END OF SECTION

SECTION 08-0001
DIVISION 8 - OPENINGS

SECTION 08-1113

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated steel doors and frames.

1.02 REFERENCE STANDARDS

A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.

B. ANSI A250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames; 2003 (R2008).

C. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 1998 (R2011).

D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.

E. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames; 2006.

F. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 2007.

1.03 SUBMITTALS

A. See Section 01-3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced grade standard.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Maintain at the project site a copy of all reference standards dealing with installation.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store in accordance with NAAMM HMMA 840.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Steel Doors and Frames:
   1. Assa Abloy Ceco or Curries: www.assaabloydss.com.
   2. Republic Doors: www.republicdoor.com.
   3. Steelcraft, an Allegion brand: www.allegion.com/us.
   4. Substitutions: See Section 01-6000 - Product Requirements.

2.02 DOORS AND FRAMES

A. Requirements for All Doors and Frames:
   1. Accessibility: Comply with ICC A117.1 and ADA Standards.
   2. Door Top Closures: Flush with top of faces and edges.
   3. Door Edge Profile: Beveled on both edges.
   4. Door Texture: Smooth faces.
   5. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
   6. Hardware Preparation: In accordance with BHMA A156.115, with reinforcement welded in place, in addition to other requirements specified in door grade standard.

7. Galvanizing for Units in Wet Areas: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness
8. Finish: Factory primed, for field finishing.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 STEEL DOORS

A. Interior Doors, Non-Fire-Rated:
1. Grade: ANSI A250.8 - SDI-100; Level 2 - Heavy-Duty, Physical Performance Level B, Model 1 - Full Flush.
2. Core: Kraftpaper honeycomb.
3. Thickness: 1-3/4 inch.

2.04 STEEL FRAMES

A. General:
1. Comply with the requirements of grade specified for corresponding door.
a. ANSI A250.8 - SDI-100, Level 2 and 3 Door Frames: 14 gage, 0.067 inch, minimum thickness.
2. Finish: Same as for door.

B. Interior Door Frames, Non-Fire-Rated: Slip-on drywall type.

2.05 ACCESSORY MATERIALS

A. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

B. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.

2.06 FINISH MATERIALS

A. Primer: Rust-inhibiting, complying with ANSI A250.10, door manufacturer's standard.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

3.02 INSTALLATION

A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.

B. Coordinate frame anchor placement with wall construction.

C. Coordinate installation of hardware.

3.03 TOLERANCES

A. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.04 ADJUSTING

A. Adjust for smooth and balanced door movement.

END OF SECTION

SECTION 08-3100

ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

1.02 REFERENCE STANDARDS

A. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.

B. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.03 SUBMITTALS

A. See Section 01-3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

C. Shop Drawings: Indicate exact position of all access door units.

PART 2 PRODUCTS

2.01 ACCESS DOOR AND PANEL APPLICATIONS

A. Walls, Unless Otherwise Indicated:
   1. Size: 12 x 12 inches, unless otherwise indicated.
   2. Standard duty, hinged door.
   3. Tool-operated spring or cam lock; no handle.
   4. In Gypsum Board: Drywall bead frame with door surface flush with wall surface.

B. Walls in Wet Areas:
   1. Size: 12 x 12 inches, unless otherwise indicated.
   2. Standard duty, hinged door.
   3. Tool-operated spring or cam lock; no handle.
   4. In Gypsum Board: Drywall bead frame with door surface flush with wall surface.

C. Ceilings, Unless Otherwise Indicated: Same type as for walls.
   1. Size in Other Ceilings: 12 x 12 inches, unless otherwise indicated.
   2. Standard duty, hinged door.
   3. Tool-operated spring or cam lock; no handle.

2.02 WALL AND CEILING UNITS

A. Manufacturers:
   1. Acudor Products Inc: www.acudor.com.
   2. Karp Associates, Inc: www.karpinc.com.
   3. Milcor by Commercial Products Group of Hart & Cooley, Inc: www.milcorinc.com.

B. Access Doors: Factory fabricated door and frame units, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies units are to be installed in.
   1. Material: Steel.
   2. Style: Exposed frame with door surface flush with frame surface.
   3. Door Style: Single thickness with rolled or turned in edges.
   4. Frames: 16 gage, 0.0598 inch, minimum.
   5. Single Thickness Steel Door Panels: 0.070 inch, minimum.
   6. Door Panels to Receive Wall/Ceiling Finish: Surface recessed 0.625 inch back from wall face.
   7. Insulation: Non-combustible mineral or glass fiber.
   8. Steel Finish: Primed.
   9. Primed Finish: Polyester powder coat; manufacturer's standard color.
   10. Hardware:
      a. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that rough openings are correctly sized and located.

3.02 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in openings. Secure rigidly in place.

C. Position units to provide convenient access to the concealed work requiring access.

END OF SECTION

SECTION 08-3613
SECTIONAL DOORS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.

B. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.

C. DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors; Door & Access Systems Manufacturers' Association, International; 2011.

D. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.02 SUBMITTALS

A. See Section 01-3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.

C. Product Data: Show component construction, anchorage method, and hardware.

D. Samples: Submit two panel finish samples, 12x12 inch in size, illustrating color and finish.

1.03 WARRANTY

A. See Section 01-7800 - Closeout Submittals for warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

C. Warranty: Include coverage for electric motor and transmission.

D. Provide five year manufacturer warranty for electric operating equipment.

PART 2 PRODUCTS

2.01 STEEL DOOR COMPONENTS

A. Steel Doors: Flush steel, insulated; standard lift operating style with track and hardware; complying with DASMA 102, Commercial application.
   1. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.
   2. Door Nominal Thickness: 2 inches thick.
   3. Exterior Finish: Factory finished with acrylic baked enamel; color as selected by Architect.
   4. Interior Finish: Factory finished with acrylic baked enamel; color as selected from manufacturers standard line.

B. Door Panels: Flush steel construction; outer steel sheet of 0.058 inch thick, flat profile; inner steel sheet of 0.058 inch thick, flat profile; core reinforcement ___ inch sheet steel roll formed to channel shape, rabbeted weather joints at meeting rails; insulated.

2.02 DOOR COMPONENTS

A. Track: Rolled galvanized steel, 0.090 inch minimum thickness; 2 inch wide, continuous one piece per side; galvanized steel mounting brackets 1/4 inch thick.

B. Hinge and Roller Assemblies: Heavy duty hinges and adjustable roller holders of galvanized steel; floating hardened steel bearing rollers, located at top and bottom of each panel, each side.

C. Lift Mechanism: Torsion spring on cross head shaft, with braided galvanized steel lifting cables.
   1. For Manual Operation: Requiring maximum exertion of 25 lbs force to open.

D. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.

E. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.

F. Head Weatherstripping: EPDM rubber seal, one piece full length.

G. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.

H. Lock: Inside center mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior handle.

2.03 MATERIALS

A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G60/Z180 coating, plain surface.

B. Insulation: Foamed-in-place polyurethane, bonded to facing.

2.04 ELECTRICAL OPERATION

A. Electrical Characteristics:
   1. 1/3 hp; manually operable in case of power failure, transit speed of 12 inches per second.

B. Motor: NEMA MG1, Type 1.

C. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.

D. Disconnect Switch: Factory mount disconnect switch in control panel.

E. Electric Operator: Center mounted draw bar assembly, adjustable safety friction clutch; brake system actuated by independent voltage solenoid controlled by motor starter; enclosed gear driven limit switch; enclosed magnetic cross line reversing starter; mounting brackets and hardware.

F. Safety Edge: At bottom of door panel, full width; electro-mechanical sensitized type, wired to stop door upon striking object; hollow neoprene covered to provide weatherstrip seal.

G. Control Station: Standard three button (open-close-stop) momentary type control for each electric operator.
   1. 24 volt circuit.
   2. Surface mounted.
   3. Locate at inside door jamb.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

B. Verify that electric power is available and of the correct characteristics.

3.02 PREPARATION

A. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.

B. Apply primer to wood frame.

3.03 INSTALLATION

A. Install door unit assembly in accordance with manufacturer's instructions.

B. Anchor assembly to wall construction and building framing without distortion or stress.

C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

D. Fit and align door assembly including hardware.

E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

3.04 TOLERANCES

A. Maximum Variation from Plumb: 1/16 inch.

B. Maximum Variation from Level: 1/16 inch.

C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.

D. Maintain dimensional tolerances and alignment with adjacent work.

3.05 ADJUSTING

A. Adjust door assembly for smooth operation and full contact with weatherstripping.

B. Have manufacturer's field representative present to confirm proper operation and identify adjustments to door assembly for specified operation.

3.06 CLEANING

A. Clean doors and frames and glazing.

B. Remove temporary labels and visible markings.

3.07 PROTECTION

A. Protect installed products from damage during subsequent construction.

B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION

SECTION 08-7100

DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hardware for hollow steel doors.

B. Thresholds.

C. Weatherstripping, seals and door gaskets.

1.02 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

C. BHMA A156.1 - American National Standard for Butts and Hinges; Builders Hardware Manufacturers Association, Inc.; 2006 (ANSI/BHMA A156.1).

D. BHMA A156.2 - American National Standard for Bored and Preassembled Locks & Latches; Builders Hardware Manufacturers Association; 2011 (ANSI/BHMA A156.2).

E. BHMA A156.4 - American National Standard for Door Controls - Closers; Builders Hardware Manufacturers Association, Inc.; 2008 (ANSI/BHMA A156.4).

F. BHMA A156.7 - American National Standard for Template Hinge Dimensions; Builders Hardware Manufacturers Association; 2003 (ANSI/BHMA A156.7).

G. BHMA A156.8 - American National Standard for Door Controls - Overhead Stops and Holders; Builders Hardware Manufacturers Association, Inc.; 2010 (ANSI/BHMA A156.8).

H. BHMA A156.18 - American National Standard for Materials and Finishes; Builders Hardware Manufacturers Association, Inc.; 2012 (ANSI/BHMA A156.18).

I. BHMA A156.22 - American National Standard for Door Gasketing and Edge Seal Systems, Builders Hardware Manufacturers Association; 2012 (ANSI/BHMA A156.22).

J. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames; Door and Hardware Institute; 2004.

K. ICC A117.1 - Accessible and Usable Buildings and Facilities; International Code Council; 2009 (ANSI).

L. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2013.

M. NFPA 101 - Life Safety Code; National Fire Protection Association; 2012.

N. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the manufacture, fabrication, and installation of products onto which door hardware will be installed.

B. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.

C. Convey Owner's keying requirements to manufacturers.

1.04 SUBMITTALS

A. See Section 01-3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project.

C. Samples: Prior to preparation of hardware schedule:

D. Hardware Schedule: Detailed listing of each item of hardware to be installed on each door. Use door numbering scheme as included in the Contract Documents. Identify electrically operated items and include power requirements.

E. Keying Schedule: Submit for approval of Owner.

F. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.

G. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.

H. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

I. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01-6000 - Product Requirements, for additional provisions.
   2. Extra Lock Cylinders: One for each master keyed group.
   3. Tools: One set of all special wrenches or tools applicable to each different or special hardware component, whether supplied by the hardware component manufacturer or not.

1.05 QUALITY ASSURANCE

A. Hardware Supplier Qualifications: Company specializing in supplying commercial door hardware with five years of experience.

1.06 WARRANTY

A. See Section 01-7800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year warranty for door closers and locksets/latchsets.

PART 2 PRODUCTS

2.01 DOOR HARDWARE - GENERAL

A. Provide all hardware specified or required to make doors fully functional, compliant with applicable codes, and secure to the extent indicated.

B. Provide all items of a single type of the same model by the same manufacturer.

C. Provide products that comply with the following:
   1. Applicable provisions of federal, state, and local codes.
   2. Accessibility: ADA Standards and ICC A117.1.
   3. ANSI/ICC A117.1, American National Standard for Accessible and Usable Buildings and Facilities.
   4. Applicable provisions of NFPA 101, Life Safety Code.
   5. Fire-Rated Doors: NFPA 80.
   6. All Hardware on Fire-Rated Doors : Listed and classified by UL as suitable for the purpose specified and indicated.

D. Function: Lock and latch function numbers and descriptions of manufactures series as listed in hardware schedule.

E. Finishes: All door hardware the same finish unless otherwise indicated.
   1. Primary Finish: Satin chrome plated over nickel on brass or bronze, 626 (approx US26D).
   2. Secondary Finish: Bright chrome plated over nickel on brass or bronze, 625 (approx US26).
      a. Use secondary finish in kitchens, bathrooms, and other spaces containing chrome or stainless steel finished appliances, fittings, and equipment; provide primary finish on one side of door and secondary finish on other side if necessary.
   3. Finish Definitions: BHMA A156.18.
   4. Exceptions:
      a. Where base metal is specified to be different, provide finish that is an appearance equivalent according to BHMA A156.18.
      b. Door Closer Covers and Arms: Color to be selected by Architect from manufacturer's standard colors.

2.02 HINGES

A. Hinges: Provide hinges on every swinging door.
   1. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
   2. Provide ball-bearing hinges at all doors having closers.
   3. Provide hinges in the quantities indicated.
   4. Provide non-removable pins on exterior outswinging doors.

B. Butt Hinges: Comply with BHMA A156.1 and A156.7; standard weight, unless otherwise indicated.
   1. Provide hinge width required to clear surrounding trim.

C. Quantity of Hinges Per Door:

1. Doors From 60 inches High up to 90 inches High: Three hinges.
2. Doors 90 inches High up to 120 inches High: Four hinges.

D. Manufacturers - Hinges:
1. Hager BB-1279, or equivalent by:
   a. Assa Abloy McKinney: www.assaabloydss.com.
2. C. R. Laurence Co., Inc; _____: www.crl-arch.com.
3. Stanley Black & Decker: www.stanleyblackanddecker.com.

2.03 LOCKS AND LATCHES

A. Locks: Provide a lock for every door, unless specifically indicated as not requiring locking.
1. "Passage" designation in Door Schedule indicates no locking required.
2. Hardware Sets indicate locking functions required for each door.
3. If no hardware set is indicated for a swinging door provide an office lockset.
4. Trim: Provide lever handle or pull trim on outside of all locks unless specifically stated to have no outside trim.
5. Lock Cylinders: Provide key access on outside of all locks unless specifically stated to have no locking or no outside trim.

B. Lock Cylinders: Manufacturer's standard tumbler type, six-pin standard core.
1. Provide cams and/or tailpieces as required for locking devices required.

C. Keying: Grand master keyed.
1. Include construction keying.
2. When providing keying information, comply with DHI Handbook "Keying systems and nomenclature".

D. Latches: Provide a latch for every door that is not required to lock, unless specifically indicated "push/pull" or "not required to latch".

2.04 CYLINDRICAL LOCKSETS

A. Cylindrical Locksets: Sargent 11 Line
1. 'J' Lever
2. 'L' Rose

B. Locking Functions: As defined in BHMA A156.2, and as follows:
1. Passage: No locking, always free entry and exit.
2. Privacy: F76, emergency tool unlocks.
3. Office: F81, key not required to lock, remains locked upon exit.
4. Two-Key Entry: F88, outside locked by key from both sides, free egress
5. Store Door: F91, locked by key from both sides, not an emergency exit (must be unlocked during occupied hours).

C. Manufacturers - Cylindrical Locksets:
1. Assa Abloy Sargent: www.assaabloydss.com.
   a. 11 Line
   b. 'j' Lever
   c. 'L' Rose
2. Equivalent products by:
   a. Hager Companies: www.hagerco.com.
   b. Schlage, an Allegion brand: www.allegion.com/us.

2.05 CLOSERS

A. Closers: Complying with BHMA A156.4.
1. Provide surface-mounted, door-mounted closers unless otherwise indicated.
2. Provide a door closer on every exterior door.
3. At outswinging exterior doors, mount closer in inside of door.

B. Manufacturers - Closers:
1. Assa Abloy Sargent: www.assaabloydss.com.
   a. 1431 Series Aluminum
   b. with Hold-Open feature

c. with Positive Stop Feature

2.06 STOPS AND HOLDERS

A. Stops: Complying with BHMA A156.8; provide a stop for every swinging door, unless otherwise indicated.
   1. Provide wall stops, unless otherwise indicated.
   2. Stop is not required if positive stop feature is specified for door closer; positive stop feature of door closer is not an acceptable substitute for a stop unless specifically so stated.

B. Wall and Floor Stops:
   1. Assa Abloy McKinney
   2. Hager
   3. Rockwood
   4. Ives

2.07 GASKETING AND THRESHOLDS

A. Gasketing and Thresholds: _____

B. Gaskets: Complying with BHMA A156.22.
   1. On each exterior door, provide weatherstripping gaskets, unless otherwise indicated; top, sides, and meeting stiles of pairs.
   2. On each exterior door, provide door bottom sweep, unless otherwise indicated.

C. Thresholds:
   1. At each exterior door, provide a threshold unless otherwise indicated.
   2. Conform to height limits imposed by ADA for changes in height.

D. Fasteners At Exterior Locations: Non-corroding.

E. Manufacturers - Gasketing and Thresholds:
   1. Assa Abloy McKinney: www.assaabloydss.com.
   2. Hager Companies: www.hagerco.com.
   3. National Guard Products, Inc: www.ngpinc.com.
   4. Pemko Manufacturing Co: www.pemko.com.
   5. Zero International, Inc: www.zerointernational.com.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that doors and frames are ready to receive work; labeled, fire-rated doors and frames are present and properly installed, and dimensions are as indicated on shop drawings.

3.02 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and applicable codes.

B. Use templates provided by hardware item manufacturer.

C. Mounting heights for hardware from finished floor to center line of hardware item:
   1. For steel doors and frames: Comply with DHI "Recommended Locations for Architectural Hardware for Steel Doors and Frames."
   2. For all doors, comply with ANSI/ADAAG guidelines for accessibility.

3.03 ADJUSTING

A. Adjust work under provisions of Section 01-7000.

B. Adjust hardware for smooth operation.

C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

3.04 CLEANING

A. Clean adjacent surfaces soiled by hardware installation. Clean finished hardware per manufacturer's instructions after final adjustments has been made. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

3.05 PROTECTION

A. Protect finished Work under provisions of Section 01-7000.

B. Do not permit adjacent work to damage hardware or finish.

END OF SECTION

SECTION 09-0001

DIVISION 9 - FINISHES

SECTION 09-2116

GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal stud wall framing.

B. Metal channel ceiling framing.

C. Acoustic insulation.

D. Cementitious backing board.

E. Gypsum wallboard.

F. Joint treatment and accessories.

1.02 REFERENCE STANDARDS

A. AISI SG02-1 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (replaced SG-971)

B. ANSI A108.11 - American National Standard for Interior Installation of Cementitious Backer Units; 2013.1.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.

D. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2012.

E. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.

F. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2011.

G. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.

H. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2011.

I. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2007 (Reapproved 2013).

J. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2010a.

K. ASTM C1288 - Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets; 1999 (Reapproved 2010).

L. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.

M. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.

N. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association; 2013.

1.03 SUBMITTALS

A. See Section 01-3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing gypsum board application and finishing, with minimum five years of documented experience.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.
   1. See PART 3 for finishing requirements.

2.02 METAL FRAMING MATERIALS

A. Manufacturers - Metal Framing, Connectors, and Accessories:
   1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
   2. Marino: www.marinoware.com.
   3. Phillips Manufacturing Company: www.phillipsmfg.com.
   4. Substitutions: See Section 01-6000 - Product Requirements.

B. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.

C. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
   1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
   2. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot dipped galvanized coating.

2.03 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. American Gypsum: www.americangypsum.com.
   2. CertainTeed Corporation: www.certainteed.com.
   3. Georgia-Pacific Gypsum: www.gpgypsum.com.
   4. Lafarge North America Inc: www.lafargenorthamerica.com.
   5. National Gypsum Company: www.nationalgypsum.com.
   6. USG Corporation: www.usg.com.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
      a. Mold-resistant board is required whenever board is being installed before the building is enclosed and conditioned.
   3. Thickness:
      a. Vertical Surfaces: 5/8 inch.
      b. Ceilings: 5/8 inch.

C. Backing Board For Wet Areas:
   1. Application: Surfaces behind tile in wet areas including Toilet Rooms.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   3. ASTM Cement-Based Board: Non-gypsum-based, cementitious board complying with ASTM C1288.
      a. Thickness: 1/2 inch.

2.04 ACCESSORIES

A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced. Thickness: 2 inches.

B. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless otherwise indicated.
   1. Types: As detailed or required for finished appearance.
   2. Special Shapes: In addition to conventional cornerbead and control joints, provide U-bead at exposed panel edges.
   3. Manufacturers - Finishing Accessories:
      a. Same manufacturer as framing materials.

C. Joint Materials: ASTM C475 and as recommended by gypsum board manufacturer for project conditions.
   1. Tape: 2 inch wide, creased paper tape for joints and corners.
   2. Powder-type vinyl-based joint compound.

D. Screws for Attachment to Steel Members Less Than 0.03 inch In Thickness, to Wood Members, and to Gypsum Board: ASTM C1002; self-piercing tapping type.

E. Screws for Attachment to Steel Members From 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws for application of gypsum board to loadbearing steel studs.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

B. Suspended Ceilings and Soffits: Space framing and furring members as permitted by standard.
   1. Level ceiling system to a tolerance of 1/1200.
   2. Laterally brace entire suspension system.

C. Studs: Space studs as indicated.
   1. Extend partition framing to structure in all locations.
   2. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.

D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

E. Blocking: Install wood blocking for support of:
   1. Framed openings.
   2. Wall mounted cabinets.
   3. Plumbing fixtures.
   4. Toilet partitions.
   5. Toilet accessories.
   6. Wall mounted door hardware.

3.03 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
   1. Place one bead continuously on substrate before installation of perimeter framing members.
   2. In non-fire-rated construction, seal around all penetrations by conduit, pipe, ducts, and rough-in boxes.

3.04 BOARD INSTALLATION

A. Comply with ASTM C 840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Non-Rated: Install gypsum board parallel to framing, with ends and edges occurring over firm bearing.

C. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.

D. Installation on Metal Framing: Use screws for attachment of all gypsum board .

E. Moisture Protection: Treat cut edges and holes in moisture resistant gypsum board with sealant.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as follows:

1. Not more than 30 feet apart on walls and ceilings over 50 feet long.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials .

3.06 JOINT TREATMENT

A. Paper Faced Gypsum Board: Use paper joint tape, bedded with powder-type vinyl-based joint compound and finished with powder-type vinyl-based joint compound.

B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   2. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
   3. Level 1: Wall areas above finished ceilings, whether or not accessible in the completed construction.

C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.
   2. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.

D. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

3.07 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09-6500

RESILIENT FLOORING

PART 1 GENERAL

1.01 SUPPLY AND INSTALL OF RESILIENT FLOOR TO BE UNDER SEPARATE CONTRACT. GC TO COOPERATE WITH THIS SUBCONTRACTOR.

1.02 SECTION INCLUDES

A. Resilient tile flooring.

B. Resilient base.

C. Installation accessories.

1.03 REFERENCE STANDARDS

A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.

B. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2010)e1.

C. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012)e1.

1.04 SUBMITTALS

A. See Section 01-3000 - Administrative Requirements, for submittal procedures.

B. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.

C. Concrete Testing Standard: Submit a copy of ASTM F710.

D. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of sub-floor is acceptable.

E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01-6000 - Product Requirements, for additional provisions.
   2. Extra Flooring Material: 15 square feet of each type and color.
   3. Extra Wall Base: 12 linear feet of each type and color.

1.05 FIELD CONDITIONS

A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.01 TILE FLOORING

A. Vinyl Composition Tile: Homogeneous, with color extending throughout thickness, and:
   1. Minimum Requirements: Comply with ASTM F1066, of Class corresponding to type specified.
   2. Size: 12 x 12 inch.
   3. Thickness: 0.125 inch.
   4. Pattern: Marbleized.
   5. Allow for up to two standard colors of tile to be used in any one room.
   6. Manufacturers:
      a. Armstrong World Industries, Inc: www.armstrong.com.
      b. Mannington Mills, Inc: www.mannington.com.
      c. Johnsonite, a Tarkett Company; Product ____: www.johnsonite.com.
      d. Substitutions: See Section 01-6000 - Product Requirements.

2.02 RESILIENT BASE

A. Resilient Base: ASTM F1861, Type TP, rubber, thermoplastic; top set Style B, Cove, and as follows:
   1. Height: 4 inch.
   2. Thickness: 0.125 inch thick.
   3. Finish: Satin.
   4. Color: Color as selected from manufacturer's standards.
   5. Accessories: Premolded external corners and end stops.

6. Manufacturers:
    a. Johnsonite, a Tarkett Company; Product ____: www.johnsonite.com.
    b. Roppe Corp: www.roppe.com.
    c. Armstrong .
    d. Mannington Mills
    e. Substitutions: See Section 01-6000 - Product Requirements.

2.03 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. Primers, Adhesives, and Seaming Materials: Waterproof; types recommended by flooring manufacturer.

C. Moldings, Transition and Edge Strips: Same material as flooring.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
    1. Test in accordance with ASTM F710.
    2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

B. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.

C. Prohibit traffic until filler is cured.

D. Clean substrate.

E. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

3.03 INSTALLATION

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install in accordance with manufacturer's instructions.

C. Spread only enough adhesive to permit installation of materials before initial set.

D. Fit joints tightly.

E. Set flooring in place, press with heavy roller to attain full adhesion.

F. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
    1. Metal Strips: Attach to substrate before installation of flooring using stainless steel screws.

H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 TILE FLOORING

A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless manufacturer's instructions say otherwise.

B. Lay flooring with joints and seams parallel to building lines to produce symmetrical tile pattern.

3.05 RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

D. Scribe and fit to door frames and other interruptions.

3.06 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's instructions.

3.07 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

SECTION 09-6700

FLUID-APPLIED FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fluid-applied flooring and base.

1.02 REFERENCE STANDARDS

1.03 SUBMITTALS

A. See Section 01-3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns and colors available; and _____.

C. Samples: Submit two samples, 6 x 6 inch in size illustrating color and pattern for each floor material for each color specified.

D. Manufacturer's Installation Instructions: Indicate special procedures.

E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, procedures for stain removal, repairing surface, and suggested schedule for cleaning.

1.04 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing work of this section with minimum three years experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store resin materials in a dry, secure area.

B. Store materials for three days prior to installation in area of installation to achieve temperature stability.

1.06 FIELD CONDITIONS

A. Maintain minimum temperature in storage area of 55 degrees F.

B. Store materials in area of installation for minimum period of 24 hours prior to installation.

C. Maintain ambient temperature required by manufacturer 72 hours prior to, during, and 24 hours after installation of materials.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fluid-Applied Flooring : Epoxy, with non-slip aggregate.
   1. Thickness: 15 mils, nominal, when dry.
   2. Texture: Smooth.
   3. Sheen: Matte.
   4. Color: To be selected by Architect.
   5. Products:
      a. Sherwin-Williams Company: General Polymers Brand; Decorative Mosaic Epoxy System: www.generalpolymers.com.
      b. Substitutions: See Section 01-6000 - Product Requirements.

2.02 ACCESSORIES

A. Divider Strips: Extruded mill finished aluminum, ____ inch thick, height to match flooring thickness, with anchoring features; color as selected.

B. Control Joint Strips: Match divider strips; ____ inch nominal width, 1/8 inch wide neoprene filler strip between side strips, with anchoring features, strip height to suit flooring thickness.

C. Cant Strips: Molded of flooring resin material.
   1. Where foundation wall is higher than finished floor level, extend flooring material 6" up the wall as base.

D. Subfloor Filler: as recommended by flooring manufacturer; type recommended by flooring material manufacturer.

E. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive flooring.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive flooring.

C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of materials to sub-floor surfaces.

D. Verify that concrete sub-floor surfaces are ready for flooring installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by flooring materials manufacturer.

E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with sub-floor filler.

B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Grind irregularities above the surface level. Prohibit traffic until filler is cured.

C. Vacuum clean substrate.

D. Apply primer to surfaces required by flooring manufacturer.

3.03 INSTALLATION - STRIPS

A. Accurately saw cut substrate to install divider strips.

B. Install strips straight and level to locations indicated.

C. Install cant strips at base of walls where flooring is to be extended up wall as base.

D. Install base divider strips to match floor pattern. Install terminating cap strip at top of base; attach securely to wall substrate.

3.04 INSTALLATION - FLOORING

A. Apply in accordance with manufacturer's instructions.

B. Apply each coat to minimum thickness indicated.

C. Finish to smooth level surface.

D. Cove at vertical surfaces.

3.05 PROTECTION

A. Prohibit traffic on floor finish for 48 hours after installation.

END OF SECTION

SECTION 09-7733

GLASS FIBER REINFORCED PLASTIC PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glass fiber reinforced plastic panels.

1.02 REFERENCE STANDARDS

A. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels; 2012.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

1.03 SUBMITTALS

A. See Section 01-3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Samples: Submit two samples 8x8 inch in size illustrating material and surface design of panels.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Glass Fiber Reinforced Plastic Panels:
   1. Crane Composites, Inc; _____: www.cranecomposites.com.
   2. Marlite; _____: www.marlite.com.
   3. Nudo; _____: www.nudo.com.
   4. Substitutions: See Section 01-6000 - Product Requirements.

2.02 PANEL SYSTEMS

A. Wall Panels at Toilet Room:
   1. Panel Size: 4 by 8 feet (1219 mm by 2438 mm).
   2. Panel Thickness: 0.075 inch (1.9 mm).
   3. Surface Design: Embossed.
   4. Color: selected from mfr's standard.
   5. Attachment Method: Mechanical fasteners concealed by trim, with sealant in joints.

2.03 MATERIALS

A. Panels: Glass fiber reinforced plastic, complying with ASTM D5319.
   1. Surface Burning Characteristics: Flame Spread Index of 25, maximum; Smoke Developed Index of 450, maximum; when whole system is tested in accordance with ASTM E84.

B. Adhesive: Type recommended by panel manufacturer.

C. Sealant: Type recommended by panel manufacturer; white.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions and substrate flatness before starting work.

B. Verify that substrate conditions are ready to receive the work of this section.

3.02 INSTALLATION - WALLS

A. Install panels in accordance with manufacturer's instructions.

B. Cut and drill panels with carbide tipped saw blades or drill bits, or cut with snips.

C. Pre-drill fastener holes in panels, 1/8 inch greater in diameter than fastener, spaced as indicated by manufacturer.

D. Apply adhesive to the back side of the panel using trowel recommended by adhesive manufacturer.

E. Apply panels to wall with seams plumb and pattern aligned with adjoining panels.

F. Install panels with manufacturer's recommended gap for panel field and corner joints.

G. Seal gaps at floor, ceiling, and between panels with specified sealant to prevent moisture intrusion.
H. Remove excess sealant as paneling is installed.

END OF SECTION

SECTION 09-9000

PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
   1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
   2. Mechanical and Electrical:
      a. In finished areas, paint shop-primed items.
      b. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
      c. Paint dampers exposed behind louvers, grilles, to match face panels.

D. Do Not Paint or Finish the Following Items:
   1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   5. Stainless steel, anodized aluminum, bronze, terne, and lead items.
   6. Floors, unless specifically so indicated.
   7. Glass.
   8. Acoustical materials, unless specifically so indicated.
   9. Concealed pipes, ducts, and conduits.

1.02 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

1.03 SUBMITTALS

A. See Section 01-3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of all products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
   4. Manufacturer's installation instructions.
   5. If proposal of substitutions is allowed under submittal procedures, explanation of all substitutions proposed.

C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.
   2. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens definitely not required.
   3. Allow 10 days for approval process, after receipt of complete samples by Architect.

D. Manufacturer's Instructions: Indicate special surface preparation procedures.

E. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01-6000 - Product Requirements, for additional provisions.
2. Extra Paint and Coatings: 1 gallon of each color; store where directed.
3. Label each container with color in addition to the manufacturer's label.

1.04 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.06 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.

B. Paints:
1. Behr Process Corporation: www.behr.com.
2. Duron, Inc: www.duron.com.
3. Benjamin Moore & Co: www.benjaminmoore.com.
4. PPG Architectural Finishes, Inc: www.ppgaf.com.
5. Pratt & Lambert Paints: www.prattandlambert.com.
6. Sherwin-Williams Company: www.sherwin-williams.com.

C. Primer Sealers: Same manufacturer as top coats.

D. Substitutions: See Section 01-6000 - Product Requirements.

2.02 PAINTS AND COATINGS - GENERAL

A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
2. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
3. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
4. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.

5. Supply each coating material in quantity required to complete entire project's work from a single production run.
6. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.

B. Primers: As follows unless other primer is required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

C. Volatile Organic Compound (VOC) Content:
1. Provide coatings that comply with the most stringent requirements specified in the following:
a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
b. Architectural coatings VOC limits of Missouri.

D. Flammability: Comply with applicable code for surface burning characteristics.

E. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

F. Colors: As indicated on drawings
1. Selection to be made by Architect after award of contract.
2. Allow for minimum of two colors for each system, unless otherwise indicated, without additional cost to Owner.
3. Extend colors to surface edges; colors may change at any edge as directed by Architect.

2.03 PAINT SYSTEMS - EXTERIOR

A. Paint ME-OP-3A - Ferrous Metals, Unprimed, Alkyd, 3 Coat:
1. One coat of alkyd primer.
2. Gloss: Two coats of alkyd enamel; ____.

B. Paint MgE-OP-3A - Galvanized Metals, Alkyd, 3 Coat:
1. One coat galvanize primer.
2. Gloss: Two coats of alkyd enamel; ____.

2.04 PAINT SYSTEMS - INTERIOR

A. Paint I-OP-MD-DT - Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals, wood, and _____:
1. Two top coats and one coat primer.
2. Top Coat(s): High Performance Architectural Interior Latex; MPI #139, 140, 141.
3. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
4. Primer(s): As recommended by manufacturer of top coats.

B. Paint I-OP-MD-WC - Medium Duty Vertical/Overhead: Including gypsum board, plaster, concrete, concrete masonry, uncoated steel, shop primed steel, galvanized steel, aluminum, and _____.
1. Two top coats and one coat primer.
2. Top Coat(s): Institutional Low Odor/VOC Interior Latex; MPI #143-148.
3. Eggshell: MPI gloss level 3; use this sheen for all gypsum board..
4. Semi-Gloss: MPI gloss level 5; use this sheen for all metal and concrete masonry.
5. Primer(s): As recommended by manufacturer of top coats.
a. Gypsum Board: MPI #50, Interior Latex Primer Sealer.

C. Paint WI-OP-3L - Wood, Opaque, Latex, 3 Coat:
1. One coat of latex primer sealer.
2. Semi-gloss: Two coats of latex enamel; _____.

D. Paint MI-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat:
1. Touch-up with latex primer.
2. Semi-gloss: Two coats of latex enamel.

E. Paint GI-OP-3L - Gypsum Board/Plaster, Latex, 3 Coat:
1. One coat of latex primer sealer.
2. Eggshell: Two coats of latex enamel; _____.

2.05 ACCESSORY MATERIALS

A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin application of coatings until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

E. Test shop-applied primer for compatibility with subsequent cover materials.

F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Gypsum Wallboard: 12 percent.
   2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
   3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to coating application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

F. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

G. Aluminum Surfaces to be Painted: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.

H. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

I. Corroded Steel and Iron Surfaces to be Painted: Prepare using at least SSPC-SP 2 (hand tool cleaning) or SSPC-SP 3 (power tool cleaning) followed by SSPC-SP 1 (solvent cleaning).

J. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand or power tool wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.

K. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.

L. Interior Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's instructions.

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance.

E. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.

F. Sand wood and metal surfaces lightly between coats to achieve required finish.

G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

A. Protect finished coatings until completion of project.

B. Touch-up damaged coatings after Substantial Completion.

END OF SECTION

SECTION 10-0001

DIVISION 10 - SPECIALTIES

SECTION 10-1400

SIGNAGE

PART 1 GENERAL

1.01 INTERIOR AND EXTERIOR SIGNAGE TO BE SUPPLIED AND INSTALLED BY OWNER, UNDER A SEPARATE CONTRACT.

END OF SECTION

SECTION 10-2800

TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Accessories for toilet rooms.

B. Grab bars.

1.02 REFERENCE STANDARDS

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Bobrick Washroom Specialties.

B. Other Acceptable Manufacturers:
   1. A & J Washroom Accessories Inc: www.ajwashroom.com.
   2. Bradley Corporation: www.bradleycorp.com.
   3. Substitutions: Section 01-6000 - Product Requirements.

C. All items of each type to be made by the same manufacturer.

2.02 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.

2.03 FINISHES

A. Stainless Steel: No. 4 Brushed finish, unless otherwise noted.

2.04 TOILET ROOM ACCESSORIES

A. Toilet Tissue Dispenser: Supplied and installed by Owner; recess mount. Coordinate location and bracing with Owner's rep.

B. Mirror
   1. Size: 18" x 30"
   2. Bobrick B-293 1830 Fixed Tilt Mirrors

C. Paper Towel Dispenser: Supplied and installed by Owner; surface mount. Coordinate location and bracing with Owner's rep.

D. Grab Bars: Stainless steel, nonslip grasping surface finish.
   1. Standard Duty Grab Bars:
      a. Push/Pull Point Load: 250 pound-force, minimum.
      b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
      c. Length and Configuration: As indicated on drawings.
      d. Products:
         1) Bobrick B-5860 x 42 and B-5860 x 24.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

3.02 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on the drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

D. Mounting Heights and Locations: As required by accessibility regulations

END OF SECTION

SECTION 12-0001

DIVISION 12 - FURNISHINGS

SECTION 12-3100

LAMINATED PLASTIC CABINETS & COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Base and Wall Cabinets

1.02 DESIGN REQUIREMENTS

A. Casework shall be of the design and dinensions indicated on the drawings, and shall include any special sizes and supports to accommodate the designs shown.

B. Fully dadoed and glued-dowel construction with concealed mechanical fastenings.

C. Where sinks are shown in pre-finished cabinets or counter tops, the sinks and rims are to be furnished and installed by the plumbing contractor, unless otherwise specified.

1.03 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate materials used, layout, dimensions, construction details, accessories included.

C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in performing the work of this section with minimum five years of experience.

1.05 DELIVERY, STORAGE, AND PROTECTION

A. Deliver cabinets and counter tops to project site in appropriate packaging.

1.06 PROJECT CONDITIONS

A. Coordinate installation of required blocking and framing with Carpentry foreman.

1.07 WARRANTY

A. See Section 01780 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cabinets
   1. Bottoms, sides, tops and vertical partitions behind doors and drawers shall be 3/4", 45 pound density particle board with a thermally fused melamine finish.
   2. All backs shall be fuly bound and shall be 1/4", 45 pound density particle board with a thermally fused melamine finish.
   3. Bottoms of wall hung units, shelves and all interiors shall have a thermally fusted melamine finish, unless otherwise specified.
   4. All shelving, where applicable, to be 1/" thick, 45 pound density particle board with a thermally fused melamine finish.
   5. All exposed vertical surfaces, ends, backs, door and drawer fronts shall be 1/32" high pressure plastic by Wilsonart, Formica Brand or other approved manufacturer. There shall be a balanced backing sheet, on all doors and drawer fronts.
   6. Exposed edges of cabinets and dividers to be 1/32" plastic laminate to to match exterior colors or heavy duty .040 PVC edge banding, colors as specified.
   7. Exposed edges of shelves to be Standard Duty .020 PVC edge banding to match interior color.

B. Hardware:
   1. Hinges to be institutional heavy-duty, five knuckle fixed pin, hosital tip, in satin chrome or satin black finish; or fully concealed, self clostin, 110 degree opening, 1/16" reveal in satin chrome or satin black finish.
   2. Door/Drawer pulls in manufacturer's stock finish selection:
      a. Metal bent wire

3. Shelf supports to be steel tracks, adjustable on 1/2" centers, maximum load rated at 500 pounds. Plastic, spoon and flat clips are not acceptable.
4. Drawer slides to be KV-1284 series, 3/4 extension, 100 pound capacity, ball bearing slike, bottom/side mount. File slides to be full extension.
5. Magnetic catches, locks and other hardware available per specifications.

C. Drawers
1. Drawer boxes to be 1/2" sides, 3/4" sub-fronts and backs, and 1/4" bottoms of 45 pound density particle board with a thermally fused melamine finish. Joints shall be doweled with the bottoms recessed 1/2" and routed 1/4" into sides and ends and securely glued. ABS plastic, wire or 'Metabox' drawers are not acceptable.

D. Counter tops: See Section 12-3600.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are suitable for installation of cabinets and counterwork.

B. Where cabinetwork installs adjacent to, attached to or in close proximity to other construction, verify before beginning installation that said adjacent construction is suitable for attachment to or covering over. Beginning the work implies acceptance of adjacent construction.

C. Notify Architect of any field conditions at variance with drawings, specifications or previously submitted sketches.

3.02 INSTALLATION

A. Cabinetry contractor will completely install all units at the proper locations where shown on the plans.

B. Installation shall be under the supervision of an experienced, competent cabinetry installer, and shall be performed by properly skilled and experienced employees. Supervision and employees shall be experienced in installation of all the related items.

C. Cabinets will be installed plumb, level and true with no distortions and all joints tight.

D. All doors, drawers, pullouts, and other moveable items shall be left plumb and aligned, and shall work with ease and without binding.

E. Cabinetry contractor shall make cutouts for sinks, plumbing, grommets or other items as necessary to onstall the cabinets.

F. Any damage as a result of shipment or installation shall be repaired or replaced by this contractor.

G. Cabinets shall be left clean and ready for use.

H. Upon completion of cabinet installation, all debris resulting from the installation operation will be disposed of off site.

3.03 PROTECTION

A. Protect installed cabinets and counter tops from subsequent construction operations.

END OF SECTION

SECTION 12-3600

COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Countertops for manufactured casework.

1.02 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2009.

C. ISFA-2 - Classification and Standards for Solid Surfacing Material; International Solid Surface Fabricators Association; 2001 (2013).

D. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

E. PS 1 - Structural Plywood; 2009.

1.03 SUBMITTALS

A. See Section 01-3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Complete details of materials and installation .

C. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

D. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

1.04 QUALITY ASSURANCE

A. Fabricator Qualifications: Same fabricator as for cabinets on which tops are to be installed.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.06 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 COUNTERTOP ASSEMBLIES

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS).

B. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
   1. Flat Sheet Thickness: 1/4 inch, minimum.
   2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA-2 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
      a. Surface Burning Characteristics: Flame spread 25, maximum; smoke developed 450, maximum; when tested in accordance with ASTM E84.
      b. NSF approved for food contact.
      c. Sinks & Bowls: provide openings for drop in fixtures.
      d. Finish on Exposed Surfaces: Semi-gloss, gloss rating of 25 to 50.
      e. Manufacturers:
         1) Avonite Surfaces : www.avonitesurfaces.com.
         2) Dupont : www.corian.com.
         3) Formica Corporation : www.formica.com.
         4) Wilsonart International, Inc : www.wilsonart.com.
         5) Substitutions: See Section 01-6000 - Product Requirements.

3. Other Components Thickness: 1/2 inch, minimum.
4. Exposed Edge Treatment: Built up to minimum 1-1/4 inch thick; bullnosed edge; use marine edge at sinks.
5. Back and End Splashes: Same sheet material, radiused top; minimum 4 inches high.
6. Fabricate in accordance with AWI/AWMAC/WI (AWS) standards, Section 11 - Premium Grade.

2.02 ACCESSORY MATERIALS

A. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.

B. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

2.03 FABRICATION

A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
   1. Join lengths of tops using best method recommended by manufacturer.
   2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
   3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.

B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
   1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
   2. Height: 4 inches, unless otherwise indicated.

C. Solid Surfacing: Fabricate tops up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.

B. Seal joint between back/end splashes and vertical surfaces.

3.04 TOLERANCES

A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.

B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.

C. Field Joints: 1/8 inch wide, maximum.

3.05 CLEANING

A. Clean countertops surfaces thoroughly.

3.06 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 13-0001

DIVISION 13 - SPECIAL CONSTRUCTION

SECTION 13-3420

METAL BUILDING SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Structural-steel framing.
   2. Metal roof panels.
   3. Metal wall panels.
   4. Metal soffit panels.
   5. Thermal insulation.
   6. Personnel doors and frames.
   7. Windows.
   8. Accessories.

1.02 DEFINITIONS

A. Terminology Standard: See MBMA's "Metal Building Systems Manual" for definitions of terms for metal building system construction not otherwise defined in this Section or in standards referenced by this Section.

1.03 COORDINATION

A. Coordinate sizes and locations of concrete foundations and casting of anchor-rod inserts into foundation walls and footings. Anchor rod installation, concrete, reinforcement, and formwork requirements are specified in Section 033000 "Cast-in-Place Concrete."

B. Coordinate metal panel assemblies with rain drainage work, flashing, trim, and construction of supports and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.04 PREINSTALLATION MEETINGS

A. Retain "Preinstallation Conference" Paragraph below if Work of this Section is extensive or complex enough to justify a conference.

B. Preinstallation Conference: Conduct conference at Project site.

C. Review methods and procedures related to metal building systems including, but not limited to, the following:
   1. Condition of foundations and other preparatory work performed by other trades.
   2. Structural load limitations.
   3. Construction schedule. Verify availability of materials and erector's personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Required tests, inspections, and certifications.
   5. Unfavorable weather and forecasted weather conditions and impact on construction schedule.

D. Review methods and procedures related to metal roof panel assemblies including, but not limited to, the following:
   1. Compliance with requirements for purlin and rafter conditions, including flatness and attachment to structural members.
   2. Structural limitations of purlins and rafters during and after roofing.
   3. Flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.
   4. Temporary protection requirements for metal roof panel assembly during and after installation.
   5. Roof observation and repair after metal roof panel installation.

E. Review methods and procedures related to metal wall panel assemblies including, but not limited to, the following:
   1. Compliance with requirements for support conditions, including alignment between and attachment to structural members.
   2. Structural limitations of girts and columns during and after wall panel installation.
   3. Flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.

4. Temporary protection requirements for metal wall panel assembly during and after installation.
5. Wall observation and repair after metal wall panel installation.

1.05 ACTION SUBMITTALS

A. Product Data: For each type of metal building system component.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
      a. Metal roof panels.
      b. Metal wall panels.
      c. Foamed-insulation-core metal panels.
      d. Metal soffit panels.
      e. Thermal insulation and vapor-retarder facings.
      f. Personnel doors and frames.
      g. Windows.
      h. Translucent roof panels.
      i. Roof ventilators.
      j. Louvers.

B. Shop Drawings: Indicate components by others. Include full building plan, elevations, sections, details and the following:
   1. Anchor-Rod Plans: Submit anchor-rod plans and templates before foundation work begins. Include location, diameter, and minimum required projection of anchor rods required to attach metal building to foundation. Indicate column reactions at each location.
   2. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
   3. Show provisions for attaching mezzanines, roof curbs, service walkways, platforms and pipe racks.
   4. Metal Roof and Wall Panel Layout Drawings: Show layouts of panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, clip spacing, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.
      a. Show roof-mounted items including roof hatches, equipment supports, pipe supports and penetrations, lighting fixtures, and items mounted on roof curbs.
      b. Show wall-mounted items including personnel doors, vehicular doors, windows, louvers, and lighting fixtures.
   5. Accessory Drawings: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:
      a. Flashing and trim.
      b. Gutters.
      c. Downspouts.

1.06 SAMPLES FOR VERIFICATION:

A. Panels: Nominal 12 inches long by actual panel width. Include fasteners, closures, and other exposed panel accessories.

B. Flashing and Trim: Nominal 12 inches long. Include fasteners and other exposed accessories.

C. Vapor-Retarder Facings: Nominal 6-inch-square Samples.

D. Windows: Full-size, nominal 12-inch-long frame Samples showing typical profile.

E. Accessories: Nominal 12-inch-long Samples for each type of accessory.

F. Door Schedule: For doors and frames. Use same designations indicated on Drawings. Include details of reinforcement.
   1. Door Hardware Schedule: Include details of fabrication and assembly of door hardware. Organize schedule into door hardware sets indicating complete designations of every item required for each door or opening.
   2. Keying Schedule: Detail Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

1.07 INFORMATIONAL SUBMITTALS

A. Qualification Data: For erector and manufacturer.

B. Welding certificates.

C. Letter of Design Certification: Signed and sealed by a qualified professional engineer. Include the following:
   1. Name and location of Project.
   2. Order number.
   3. Name of manufacturer.
   4. Name of Contractor.
   5. Building dimensions including width, length, height, and roof slope.
   6. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
   7. Governing building code and year of edition.
   8. Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads (cranes).
   9. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
   10. Building-Use Category: Indicate category of building use and its effect on load importance factors.

D. Erector Certificates: For qualified erector, from manufacturer.

E. Material Test Reports: For each of the following products:
   1. Structural steel including chemical and physical properties.
   2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
   3. Tension-control, high-strength, bolt-nut-washer assemblies.
   4. Shop primers.
   5. Nonshrink grout.

F. Field quality-control reports.

G. Surveys: Show final elevations and locations of major members. Indicate discrepancies between actual installation and the Contract Documents. Have surveyor who performed surveys certify their accuracy.

1.08 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panel finishes and door hardware to include in maintenance manuals.

1.09 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Accreditation: Manufacturer's facility accredited according to the International Accreditation Service's AC472, "Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems."
   2. Engineering Responsibility: Preparation of comprehensive engineering analysis and Shop Drawings by a professional engineer who is legally qualified to practice in jurisdiction where Project is located.

B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.

C. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
   2. AWS D1.3, "Structural Welding Code - Sheet Steel."

D. Land Surveyor Qualifications: A professional land surveyor who practices in jurisdiction where Project is located and who is experienced in providing surveying services of the kind indicated.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Weather Limitations: Proceed with panel installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.

1.11 WARRANTY

A. Special Warranty on Metal Panel Finishes: Manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
      a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
      b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
      c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
      d. Verify available warranties and warranty periods.
      e. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Source Limitations: Obtain metal building system components, including primary and secondary framing and metal panel assemblies, from single source from single manufacturer.

2.02 SYSTEM DESCRIPTION

A. Provide a complete, integrated set of mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior.

B. Primary-Frame Type:
   1. Rigid Clear Span: Solid-member, structural-framing system without interior columns.

C. End-Wall Framing: Manufacturer's standard, for buildings not required to be expandable, consisting of primary frame, capable of supporting one-half of a bay design load, and end-wall columns.

D. Secondary-Frame Type: Manufacturer's standard purlins and joists and exterior-framed (bypass) girts.

E. Eave Height: 14feet.

F. Bay Spacing: As indicated on Drawings.

G. Roof Slope: One inch per 12 inches.

H. Roof System: Manufacturer's standard standing-seam, trapezoidal-rib, metal roof panels.

I. Exterior Wall System: Manufacturer's standard exposed-fastener, tapered-rib, metal wall panels.
   1. Liner Panels: Tapered rib.

2.03 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design metal building system.

B. Structural Performance: Metal building systems shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to procedures in MBMA's "Metal Building Systems Manual."
   1. Design Loads:
      a. Uniform Roof Loads
         1) Dead Load: Actual Weight of Components
         2) Collateral Load: 4 psf
         3) Live Load: 20 psf
         4) Snow Load: 20 psf
         5) Point Roof Loads
            (a) Point loads from hanging or rooftop equipment shall be coordinated with Architect and MEP.
         6) Wind Load Design Criteria
            (a) Basic Wind Speed: 90 mph

(b) Wind Importance Factor: 1.0
(c) Wind Exposure Category: B

7) Seismic Load Design Criteria
(a) Occupancy Category: II
(b) Site Class: D
(c) Zip Code: 63050
(d) Occupancy Importance Factor: 1.0

b. Deflection and Drift Limits: Design metal building system assemblies to withstand serviceability design loads without exceeding deflections and drift limits recommended in AISC Steel Design Guide No. 3 "Serviceability Design Considerations for Steel Buildings."

C. Seismic Performance: Metal building system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

E. Air Infiltration for Metal Roof Panels: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 1680 at the following test-pressure difference:
1. Test-Pressure Difference: 1.57 lbf/sq. ft.

F. Air Infiltration for Metal Wall Panels: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 283 at the following test-pressure difference:
1. Test-Pressure Difference: 1.57 lbf/sq. ft.

G. Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E 1646 at the following test-pressure difference:
1. Test-Pressure Difference: 2.86 lbf/sq. ft.

H. Water Penetration for Metal Wall Panels: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
1. Test-Pressure Difference: 2.86 lbf/sq. ft.

I. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
1. Uplift Rating: UL 30.

J. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings."

K. Bolted Connections: Comply with RCSC's "Specification for Structural Joints Using High-Strength Bolts."

L. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.

M. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafters, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.
1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.
a. Slight variations in span and spacing may be acceptable if necessary to comply with manufacturer's standard, as approved by Architect.
b. Rigid Clear-Span Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are not permitted.
c. Frame Configuration: Single gable.
d. Exterior Column: Tapered.
e. Rafter: Tapered.

N. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly to comply with the following:
1. End-Wall and Corner Columns: I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates; or C-shaped, cold-formed, structural-steel sheet.

O. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate framing from either cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet, prepainted with coil coating, to comply with the following:
   1. Purlins: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; minimum 2-1/2-inch-wide flanges.
      a. Depth: As needed to comply with system performance requirements.
      b. Girts: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 40 to 50 degrees from flange, with minimum 2-1/2-inch-wide flanges.
         1) Depth: As required to comply with system performance requirements.
      c. Eave Struts: Unequal-flange, C-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; to provide adequate backup for metal panels.
      d. Flange Bracing: Minimum 2-by-2-by-1/8-inch structural-steel angles or 1-inch-diameter, cold-formed structural tubing to stiffen primary-frame flanges.
      e. Sag Bracing: Minimum 1-by-1-by-1/8-inch structural-steel angles.
      f. Base or Sill Angles: Manufacturer's standard base angle, minimum 3-by-2-inch, fabricated from zinc-coated (galvanized) steel sheet.
      g. Purlin and Girt Clips: Manufacturer's standard clips fabricated from steel sheet. Provide galvanized clips where clips are connected to galvanized framing members.
      h. Framing for Openings: Channel shapes; fabricated from cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings and head, jamb, and sill of other openings.
      i. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.

P. Bracing: Provide adjustable wind bracing using any method as follows:
   1. Rods: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50; or ASTM A 529/A 529M, Grade 50; minimum 1/2-inch-diameter steel; threaded full length or threaded a minimum of 6 inches at each end.
   2. Cable: ASTM A 475, minimum 1/4-inch-diameter, extra-high-strength grade, Class B, zinc-coated, seven-strand steel; with threaded end anchors.
   3. Angles: Fabricated from structural-steel shapes to match primary framing, of size required to withstand design loads.
   4. Rigid Portal Frames: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
   5. Fixed-Base Columns: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
   6. Diaphragm Action of Metal Panels: Design metal building to resist wind forces through diaphragm action of metal panels.

Q. Anchor Rods: Headed anchor rods as indicated in Anchor Rod Plan for attachment of metal building to foundation.

R. Materials:
   1. W-Shapes: ASTM A 992/A 992M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.
   2. Channels, Angles, M-Shapes, and S-Shapes: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.
   3. Plate and Bar: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.
   4. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
   5. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B or C, structural tubing.
   6. Structural-Steel Sheet: Hot-rolled, ASTM A 1011/A 1011M, Structural Steel (SS), Grades 30 through 55, or High-Strength Low-Alloy Steel (HSLAS) or High-Strength Low-Alloy Steel with Improved Formability (HSLAS-F), Grades 45 through 70; or cold-rolled, ASTM A 1008/A 1008M, Structural Steel (SS), Grades 25 through 80, or HSLAS, Grades 45 through 70.

7. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, SS, Grades 33 through 80, or HSLAS or HSLAS-F, Grades 50 through 80; with G60 coating designation; mill phosphatized.
8. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
    a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, SS, Grades 33 through 80, or HSLAS or HSLAS-F, Grades 50 through 80; with G90 coating designation.
    b. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, SS, Grade 50 or 80; with Class AZ50 coating.
    c. Joist Girders: Manufactured according to "Standard Specifications for Joist Girders," in SJI's "Standard Specifications and Load Tables for Steel Joists and Joist Girders"; with steel-angle, top- and bottom-chord members, and end- and top-chord arrangements as indicated on Drawings and required for primary framing.
    d. Steel Joists: Manufactured according to "Standard Specifications for Open Web Steel Joists, K-Series," in SJI's "Standard Specifications and Load Tables for Steel Joists and Joist Girders"; with steel-angle, top- and bottom-chord members, and end- and top-chord arrangements as indicated on Drawings and required for secondary framing.
    e. Non-High-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A, carbon-steel, hex-head bolts; ASTM A 563 carbon-steel hex nuts; and ASTM F 844 plain (flat) steel washers.
        1) Finish: Hot-dip zinc coating, ASTM F 2329, Class C.
    f. Structural Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563 heavy-hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
        1) Finish: Hot-dip zinc coating, ASTM F 2329, Class C.
    g. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts; ASTM A 563 heavy-hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers, plain.
    h. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex-head steel structural bolts with spline ends.
        1) Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50.
    i. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
        1) Configuration: Straight.
        2) Nuts: ASTM A 563 heavy-hex carbon steel.
        3) Plate Washers: ASTM A 36/A 36M carbon steel.
        4) Washers: ASTM F 436 hardened carbon steel.
        5) Finish: Hot-dip zinc coating, ASTM F 2329, Class C.
    j. Headed Anchor Rods: ASTM F 1554, Grade 36.
        1) Configuration: Straight.
        2) Nuts: ASTM A 563 heavy-hex carbon steel.
        3) Plate Washers: ASTM A 36/A 36M carbon steel.
        4) Washers: ASTM F 436 hardened carbon steel.
        5) Finish: Hot-dip zinc coating, ASTM F 2329, Class C.
    k. Threaded Rods: ASTM A 36/A 36M.
        1) Nuts: ASTM A 563 heavy-hex carbon steel.
        2) Washers: ASTM A 36/A 36M carbon steel.
        3) Finish: Hot-dip zinc coating, ASTM F 2329, Class C.

S. Finish: Factory primed. Apply specified primer immediately after cleaning and pretreating.
1. Clean and prepare in accordance with SSPC-SP2.
2. Coat with manufacturer's standard primer. Apply primer to primary and secondary framing to a minimum dry film thickness of 1 mil.
    a. Prime secondary framing formed from uncoated steel sheet to a minimum dry film thickness of 0.5 mil on each side.
3. If required, insert requirements for crane runway beams, supports, and bracing; mezzanine framing and decking; and floor framing for multistory applications.

2.04 METAL ROOF PANELS

A. Standing-Seam, Trapezoidal-Rib, Metal Roof Panels: Formed with raised trapezoidal ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation

by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels.

1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, .024-inch nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
    a. Exterior Finish: Two-coat fluoropolymer
    b. Color: As selected by Architect from manufacturer's full range
    c. Clips: Two-piece floating to accommodate thermal movement.
    d. Joint Type: Panels snapped together or Mechanically seamed.
    e. Panel Coverage: 24 inches
    f. Panel Height: 3 inches
    g. Uplift Rating: UL 30

B. Finishes:

1. Exposed Coil-Coated Finish:
    a. Retain "Two-Coat Fluoropolymer," "Three-Coat Fluoropolymer," or "Siliconized Polyester" Subparagraph below, or add other finishes to suit Project.
    b. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
    c. Finish in "Concealed Finish" Subparagraph below is frequently used as a factory finish for interior surfaces.
    d. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2.05 METAL WALL PANELS

A. Exposed-Fastener, Tapered-Rib, Metal Wall Panels: Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.

1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.024-inch nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
    a. Exterior Finish: Two-coat fluoropolymer
    b. Color: As selected by Architect from manufacturer's full range
    c. Major-Rib Spacing: 6 inches o.c.
    d. Panel Coverage: 36 inches
    e. Panel Height: 1.5 inches

B. Finishes:

1. Exposed Coil-Coated Finish:
    a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
    b. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2.06 THERMAL INSULATION

A. Faced Metal Building Insulation: ASTM C 991, Type II, glass-fiber-blanket insulation; 0.5-lb/cu. ft. density; 2-inch-wide, continuous, vapor-tight edge tabs; with a flame-spread index of 25 or less.

B. Retainer Strips: For securing insulation between supports, 0.025-inch nominal-thickness, formed, metallic-coated steel or PVC retainer clips colored to match insulation facing.

C. Vapor-Retarder Facing: ASTM C 1136, with permeance not greater than 0.02 perm when tested according to ASTM E 96/E 96M, Desiccant Method.

1. Composition: White metallized-polypropylene film facing, fiberglass scrim reinforcement, and kraft-paper backing.

D. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

2.07 PERSONNEL DOORS AND FRAMES

A. Swinging Personnel Doors and Frames: Metal building system manufacturer's standard doors and frames; prepared and reinforced at strike and at hinges to receive factory- and field-applied hardware according to BHMA A156 Series.
   1. Steel face thickness in "Steel Doors" Subparagraph below corresponds to 20-gage and is typical for steel building system manufacturers.
   2. Steel Doors: 1-3/4 inches thick; fabricated from metallic-coated steel face sheets, 0.036-inch nominal uncoated steel thickness, of seamless, hollow-metal construction; with 0.060-inch nominal uncoated steel thickness, inverted metallic-coated steel channels welded to face sheets at top and bottom of door.
      a. Design: Flush panel.
      b. Core: Polystyrene foam with U-factor rating of at least 0.16 Btu/sq. ft. x h x deg F.
      c. Glazing Frames: Steel frames to receive field-installed glass.
      d. Steel Frames: Fabricate 2-inch-wide face frames from zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.060-inch nominal uncoated steel thickness.
         1) Type: Factory welded.
      e. Fabricate concealed stiffeners, reinforcement, edge channels, and moldings from either cold- or hot-rolled steel sheet.

B. Hardware - Provide hardware for each door leaf, as follows:
   1. Provide hardware for each door leaf, as follows:
   2. Hinges: BHMA A156.1. Three plain-bearing, standard-weight, full-mortise, stainless-steel or bronze, template-type hinges; 4-1/2 by 4-1/2 inches, with nonremovable pin.
   3. Lockset: BHMA A156.2. Key-in-lever cylindrical type.
   4. Threshold: BHMA A156.21. Extruded aluminum.
   5. Silencers: Pneumatic rubber; three silencers on strike jambs of single door frames and two silencers on heads of double door frames.
   6. Closer: BHMA A156.4. Surface-applied, standard-duty hydraulic type.
   7. Weather Stripping: Vinyl applied to head and jambs, with vinyl sweep at sill.
   8. Anchors and Accessories: Manufacturer's standard units, galvanized according to ASTM A 123/A 123M.
   9. Fabrication: Fabricate doors and frames to be rigid; neat in appearance; and free from defects, warp, or buckle. Provide continuous welds on exposed joints; grind, dress, and make welds smooth, flush, and invisible.

C. Materials:
   1. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.

D. Finishes for Personnel Doors and Frames:
   1. Prime Finish: Factory-apply manufacturer's standard primer immediately after cleaning and pretreating.
      a. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.08 WINDOWS

A. Aluminum Windows: Metal building system manufacturer's standard, with self-flashing mounting fins, and as follows:
   1. Type, Performance Class, and Performance Grade: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 and as follows:
      a. Single-Hung Units: H-CW30.
      b. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 0.064-inch thickness at any location for main frame and sash members.

1) Thermally Improved Construction: Fabricate window units with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.

c. Fasteners, Anchors, and Clips: Nonmagnetic stainless steel, aluminum, or other noncorrosive material, compatible with aluminum window members, trim, hardware, anchors, and other components of window units. Fasteners shall not be exposed, except for attaching hardware.
   1) Reinforcement: Where fasteners screw-anchor into aluminum less than 0.128 inch thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, noncorrosive, pressed-in, spline grommet nuts.

d. Hardware: Manufacturer's standard; of aluminum, stainless steel, die-cast steel, malleable iron, or bronze; including the following:
   1) Spring-loaded, snap-type lock at jambs.
   2) Lift handles for single-hung units.

e. Sliding-Type Weather Stripping: Woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric; complying with AAMA 701/702.

f. Insect Screens: Provide removable insect screen on each operable exterior sash, with screen frame finished to match window unit, and as follows:
   1) Aluminum Wire Fabric: 18-by-18, 18-by-16, or 18-by-14 mesh of 0.013-inch-diameter, coated aluminum wire; complying with FS RR-W-365, Type VII.

B. Glazing:
1. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear), 3 mm thick.
2. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of 2.5-mm-thick clear float glass separated by a dehydrated interspace, qualified according to ASTM E 2190.
3. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201.
   a. Provide safety glazing labeling.
   b. Glazing Stops: Screw-applied glazing stops coordinated with glazing system indicated. Match material and finish of window frames.
   c. Factory-Glazed Fabrication: Glaze window units in the factory to greatest extent possible and practical for applications indicated.

C. Finish:
1. Baked-Enamel Finish, Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 except with a minimum dry film thickness of 0.7 mil, medium gloss.
   a. Color: As selected by Architect from manufacturer's full range.

2.09 ACCESSORIES

A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.
1. Form exposed sheet metal accessories that are without excessive oil-canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
1. Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.
2. Retain "Clips" and "Cleats" subparagraphs below only with standing-seam metal roof panels.
3. Clips: Manufacturer's standard, formed from stainless-steel sheet, designed to withstand negative-load requirements.
4. Cleats: Manufacturer's standard, mechanically seamed cleats formed from stainless-steel sheet or nylon-coated aluminum sheet.
5. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
6. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded

to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

7. Thermal Spacer Blocks: Where metal panels attach directly to purlins, provide thermal spacer blocks of thickness required to provide 1-inch standoff; fabricated from extruded polystyrene.

C. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fasciae, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.
   1. Closures: Provide closures at eaves and rakes, fabricated of same material as metal wall panels.
   2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
   3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

D. Flashing and Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch nominal uncoated steel thickness, prepainted with coil coating; finished to match adjacent metal panels.
   1. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
   2. Opening Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.030-inch nominal uncoated steel thickness, prepainted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.

E. Gutters: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch nominal uncoated steel thickness, prepainted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch-long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."
   1. Gutter Supports: Fabricated from same material and finish as gutters.
   2. Strainers: Bronze, copper, or aluminum wire ball type at outlets.

F. Downspouts: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch nominal uncoated steel thickness, prepainted with coil coating; finished to match metal wall panels. Fabricate in minimum 10-foot-long sections, complete with formed elbows and offsets.
   1. Mounting Straps: Fabricated from same material and finish as gutters.

G. Louvers: Size and design indicated; self-framing and self-flashing. Fabricate welded frames from zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.048-inch nominal uncoated steel thickness; finished to match metal wall panels. Form blades from zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.036-inch nominal uncoated steel thickness; folded or beaded at edges, set at an angle that excludes driving rains, and secured to frames by riveting or welding. Fabricate louvers with equal blade spacing to produce uniform appearance.
   1. Blades: Fixed.
   2. Bird Screening: Galvanized steel, 1/2-inch-square mesh, 0.041-inch wire; with rewirable frames, removable and secured with clips; fabricated of same kind and form of metal and with same finish as louvers.
      a. Mounting: Exterior face of louvers.
      b. Vertical Mullions: Provide mullions at spacings recommended by manufacturer, or 72 inches o.c., whichever is less.

H. Roof Curbs: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.048-inch nominal uncoated steel thickness prepainted with coil coating; finished to match metal roof panels; with welded top box and bottom skirt, and integral full-length cricket; capable of withstanding loads of size and height indicated.
   1. Curb Subframing: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.060-inch nominal uncoated steel thickness, angle-, C-, or Z-shaped metallic-coated steel sheet.
   2. Insulation: 1-inch-thick, rigid type.

I. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.

2.10 MATERIALS:

A. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of materials being fastened by means of plastic caps or factory-applied coating.
   1. Fasteners for Metal Roof Panels: Self-drilling, Type 410 stainless steel or self-tapping, Type 304 stainless-steel or zinc-alloy-steel hex washer head, with EPDM washer under heads of fasteners bearing on weather side of metal panels.
   2. Fasteners for Metal Wall Panels: Self-drilling, Type 410 stainless steel or self-tapping, Type 304 stainless-steel or zinc-alloy-steel hex washer head, with EPDM sealing washers bearing on weather side of metal panels.
   3. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
   4. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
   5. Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
   6. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.
   7. Metal Panel Sealants:
      a. Joint Sealant: ASTM C 920; one part elastomeric polyurethane or polysulfide; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended by metal building system manufacturer.

2.11 FABRICATION

A. General: Design components and field connections required for erection to permit easy assembly.
   1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
   2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.

B. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.

C. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
   1. Make shop connections by welding or by using high-strength bolts.
   2. Join flanges to webs of built-up members by a continuous, submerged arc-welding process.
   3. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin web or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
   4. Weld clips to frames for attaching secondary framing if applicable, or punch for bolts.
   5. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary framing with specified primer after fabrication.

D. Secondary Framing: Shop fabricate framing components to indicated size and section by roll forming or break forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.
   1. Make shop connections by welding or by using non-high-strength bolts.
   2. Shop Priming: Prepare uncoated surfaces for shop priming according to SSPC-SP 2. Shop prime uncoated secondary framing with specified primer after fabrication.

E. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.
   1. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of metal panel.

2.12 SOURCE QUALITY CONTROL

A. The 2012 International Building Code requires that special inspections of structural steel be performed in accordance with the quality assurance and inspection requirements of AISC 360 for steel frame construction.

B. Accredited Manufacturers: Special inspections will not be required if fabrication is performed by an IAS AC472-accredited manufacturer approved by authorities having jurisdiction to perform such Work without special inspection.

1. After fabrication, submit copy of certificate of compliance to authorities having jurisdiction, certifying that Work was performed according to Contract requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with erection only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.

B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place unless otherwise indicated.

3.03 ERECTION OF STRUCTURAL FRAMING

A. Erect metal building system according to manufacturer's written instructions and drawings.

B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.

C. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.

D. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Review subparagraph below with structural engineer and revise to suit Project. Delete if not required.
3. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.

F. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.

1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt type and joint type specified.
    a. Joint Type: Snug tightened or pretensioned as required by manufacturer.

G. Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.
   1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
   2. Locate and space wall girts to suit openings such as doors and windows.
   3. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.

H. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.
   1. Tighten rod and cable bracing to avoid sag.
   2. Locate interior end-bay bracing only where indicated.

I. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.

J. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.

3.04 METAL PANEL INSTALLATION, GENERAL

A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Examination: Examine primary and secondary framing to verify that structural-panel support members and anchorages have been installed within alignment tolerances required by manufacturer.
   1. Examine roughing-in for components and systems penetrating metal panels, to verify actual locations of penetrations relative to seams before metal panel installation.

C. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

D. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.
   1. Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.
   2. Install metal panels perpendicular to structural supports unless otherwise indicated.
   3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
   4. Locate and space fastenings in uniform vertical and horizontal alignment.
   5. Locate metal panel splices over structural supports with end laps in alignment.
   6. Lap metal flashing over metal panels to allow moisture to run over and off the material.

E. Lap-Seam Metal Panels: Install screw fasteners using power tools with controlled torque adjusted to compress EPDM washers tightly without damage to washers, screw threads, or metal panels. Install screws in predrilled holes.
   1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.

F. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

G. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated; or, if not indicated, provide types recommended by metal panel manufacturer.
   1. Seal metal panel end laps with double beads of tape or sealant the full width of panel. Seal side joints where recommended by metal panel manufacturer.
   2. Retain subparagraph below if joint-sealant work is part of this Section.

H. Prepare joints and apply sealants to comply with requirements in Section 079005 "Joint Sealants."

3.05 METAL ROOF PANEL INSTALLATION

A. General: Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.

1. Install ridge and hip caps as metal roof panel work proceeds.
2. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.

B. Lap-Seam Metal Roof Panels: Fasten metal roof panels to supports with exposed fasteners at each lapped joint, at location and spacing recommended by manufacturer.
1. Provide metal-backed sealing washers under heads of exposed fasteners bearing on weather side of metal roof panels.
2. Provide sealant tape at lapped joints of metal roof panels and between panels and protruding equipment, vents, and accessories.
3. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps and on side laps of nesting-type metal panels, on side laps of ribbed or fluted metal panels, and elsewhere as needed to make metal panels weatherproof to driving rains.
4. At metal panel splices, nest panels with minimum 6-inch end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.

C. Metal Fascia Panels: Align bottom of metal panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws. Flash and seal metal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

3.06 METAL WALL PANEL INSTALLATION

A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

B. Unless otherwise indicated, begin metal panel installation at corners with center of rib lined up with line of framing.

C. Shim or otherwise plumb substrates receiving metal wall panels.

D. When two rows of metal panels are required, lap panels 4 inches minimum.

E. When building height requires two rows of metal panels at gable ends, align lap of gable panels over metal wall panels at eave height.

F. Rigidly fasten base end of metal wall panels and allow eave end free movement for thermal expansion and contraction. Predrill panels.

G. Flash and seal metal wall panels with weather closures at eaves and rakes, and at perimeter of all openings. Fasten with self-tapping screws.

H. Install screw fasteners in predrilled holes.

I. Install flashing and trim as metal wall panel work proceeds.

J. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated on Drawings; if not indicated, as necessary for waterproofing.

K. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws.

L. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

M. Metal Wall Panels: Install metal wall panels on exterior side of girts. Attach metal wall panels to supports with fasteners as recommended by manufacturer.

3.07 THERMAL INSULATION INSTALLATION

A. General: Install insulation concurrently with metal panel installation, in thickness indicated to cover entire surface, according to manufacturer's written instructions.
1. Set vapor-retarder-faced units with vapor retarder toward warm side of construction unless otherwise indicated. Do not obstruct ventilation spaces except for firestopping.
2. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to the surrounding construction to ensure airtight installation.
3. Install factory-laminated, vapor-retarder-faced blankets straight and true in one-piece lengths, with both sets of facing tabs sealed, to provide a complete vapor retarder.
4. Install blankets straight and true in one-piece lengths. Install vapor retarder over insulation, with both sets of facing tabs sealed, to provide a complete vapor retarder.

B. Blanket Roof Insulation: Comply with the following installation method:
   1. Over-Purlin-with-Spacer-Block Installation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Install layer of filler insulation over first layer to fill space formed by metal roof panel standoffs. Hold in place by panels fastened to standoffs.
      a. Thermal Spacer Blocks: Where metal roof panels attach directly to purlins, install thermal spacer blocks.
         1) Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.

C. Blanket Wall Insulation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Hold in place by metal wall panels fastened to secondary framing.
   1. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.

3.08 DOOR AND FRAME INSTALLATION

A. General: Install doors and frames plumb, rigid, properly aligned, and securely fastened in place according to manufacturers' written instructions. Coordinate installation with wall flashings and other components. Seal perimeter of each door frame with elastomeric sealant used for metal wall panels.

B. Personnel Doors and Frames: Install doors and frames according to NAAMM-HMMA 840. Fit non-fire-rated doors accurately in their respective frames, with the following clearances:
   1. Between Doors and Frames at Jambs and Head: 1/8 inch.
   2. Between Edges of Pairs of Doors: 1/8 inch.
   3. At Door Sills with Threshold: 3/8 inch.

C. Door Hardware:
   1. Install surface-mounted items after finishes have been completed at heights indicated in DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
   2. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
   3. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
   4. Set thresholds for exterior doors in full bed of sealant complying with requirements for concealed mastics specified in Section 079200 "Joint Sealants."

3.09 WINDOW INSTALLATION

A. General: Install windows plumb, rigid, properly aligned, without warp or rack of frames or sash, and securely fasten in place according to manufacturer's written instructions. Coordinate installation with wall flashings and other components. Seal perimeter of each window frame with elastomeric sealant used for metal wall panels.
   1. Separate dissimilar materials from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified in AAMA/WDMA/CSA 101/I.S.2/A440.

B. Set sill members in bed of sealant or with gaskets, for weathertight construction.

C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

D. Mount screens directly to frames with tapped screw clips.

3.10 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

B. Install components required for a complete metal roof panel assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

C. Install components for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

D. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.

E. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
   1. Install exposed flashing and trim that is without excessive oil-canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
   2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

F. Gutters: Join sections with riveted-and-soldered or lapped-and-sealed joints. Attach gutters to eave with gutter hangers spaced as required for gutter size, but not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

G. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
   1. Tie downspouts to underground drainage system indicated.

H. Louvers: Locate and place louver units level, plumb, and at indicated alignment with adjacent work.
   1. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
   2. Provide perimeter reveals and openings of uniform width for sealants and joint fillers.
   3. Protect galvanized- and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of corrosion-resistant paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.
   4. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.

I. Roof Curbs: Install curbs at locations indicated on Drawings. Install flashing around bases where they meet metal roof panels.

J. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.

3.11 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform field quality control special inspections and to submit reports.

B. Product will be considered defective if it does not pass tests and inspections.

3.12 ADJUSTING

A. Doors: After completing installation, test and adjust doors to operate easily, free of warp, twist, or distortion.

B. Door Hardware: Adjust and check each operating item of door hardware and each door to ensure proper operation and function of every unit. Replace units that cannot be adjusted to operate as intended.

C. Windows: Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and at weather stripping to ensure smooth operation and weathertight closure. Lubricate hardware and moving parts.

3.13 CLEANING AND PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.

B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

C. Touchup Painting: After erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing, bearing plates, and accessories.
   1. Clean and prepare surfaces by SSPC-SP 2, "Hand Tool Cleaning," or by SSPC-SP 3, "Power Tool Cleaning."
   2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

D. Metal Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
   1. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

E. Doors and Frames: Immediately after installation, sand rusted or damaged areas of prime coat until smooth and apply touchup of compatible air-drying primer.
   1. Immediately before final inspection, remove protective wrappings from doors and frames.

F. Windows: Clean metal surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances. Clean factory-glazed glass immediately after installing windows.

G. Louvers: Clean exposed surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.
   1. Restore louvers damaged during installation and construction period so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.
   2. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION

SECTION 22-0001

DIVISION 22 - PLUMBING

SECTION 22-0720

PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

1.02 REFERENCE STANDARDS

A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2011be1.

B. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008.

C. ASTM D1056 - Standard Specification for Flexible Cellular Materials--Sponge or Expanded Rubber; 2007.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2012.

E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2010.

F. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.

G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

PART 2 PRODUCTS

2.01 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, NFPA 255, or UL 723.

2.02 GLASS FIBER

A. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
   1. 'K' value: ASTM C177, 0.24 at 75 degrees F.
   2. Maximum moisture absorption: 0.2 percent by volume.

B. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.

C. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

2.03 EXPANDED POLYSTYRENE

A. Insulation: ASTM C578; rigid closed cell.
   1. 'K' value: 0.23 at 75 degrees F.
   2. Maximum service temperature: 165 degrees F.
   3. Maximum water vapor permeance: 5.0 perms

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. Exposed Piping: Locate insulation and cover seams in least visible locations.

D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.

E. Glass fiber insulated pipes conveying fluids below ambient temperature:

1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

F. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

G. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07840.

H. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

I. Buried Piping: Provide factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with one mil thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with a polyester film.

END OF SECTION

SECTION 22-1007

PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Floor drains.

B. Cleanouts.

C. Backflow preventers.

1.02 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; current edition; (ADA Standards for Accessible Design).

B. ASME A112.6.3 - Floor and Trench Drains; The American Society of Mechanical Engineers; 2001 (R2007).

C. ASSE 1011 - Hose Connection Vacuum Breakers; American Society of Sanitary Engineering; 2004 (ANSI/ASSE 1011).

D. ASSE 1013 - Reduced Pressure Principle Backflow Preventers and Reduced Pressure Fire Protection Principle Backflow Preventers; American Society of Sanitary Engineering; 2011.

E. ASSE 1019 - Vacuum Breaker Wall Hydrants, Freeze Resistant Automatic Draining Type; American Society of Sanitary Engineering; 2011 (ANSI/ASSE 1019).

1.03 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.

C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.

D. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.

E. Project Record Documents: Record actual locations of equipment, cleanouts, backflow preventers, water hammer arrestors and all equipment and accessories.

F. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01600 - Product Requirements, for additional provisions.
   2. Extra Loose Keys for Outside Hose Bibbs: One.
   3. Extra Hose End Vacuum Breakers for Hose Bibbs: One.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Accept specialties on site in original factory packaging. Inspect for damage.

PART 2 PRODUCTS

2.01 DRAINS

A. See Mechanical Engineer's plans and notes for product selections.

2.02 CLEANOUTS

A. Manufacturers:
   1. Jay R. Smith Manufacturing Company: www.jayrsmith.com.
   2. Josam Company: www.josam.com.
   3. Zurn Industries, Inc: www.zurn.com.
   4. Substitutions: See Section 01600 - Product Requirements.

B. See Mechanical Engineer's plans and notes for product selections.

2.03 HOSE BIBBS

A. Manufacturers:
   1. Jay R. Smith Manufacturing Company: www.jayrsmith.com.
   2. Watts Regulator Company: www.wattsregulator.com.

3. Zurn Industries, Inc: www.zurn.com.
4. Substitutions: See Section 01600 - Product Requirements.

B. Interior Hose Bibbs:
1. Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, chrome plated where exposed with handwheel, integral vacuum breaker in conformance with ASSE 1011.

2.04 HYDRANTS

A. Manufacturers:
1. Jay R. Smith Manufacturing Company; www.jayrsmith.com.
2. Zurn Industries, Inc; Model; www.zurn.com.
3. Substitutions: See Section 01600 - Product Requirements.

B. Wall Hydrants:
1. ASSE 1019; freeze resistant, self-draining type with chrome plated wall plate hose thread spout, handwheel, and integral vacuum breaker.

2.05 BACKFLOW PREVENTERS

A. Manufacturers:
1. Conbraco Industries: www.conbraco.com.
2. Watts Regulator Company: www.wattsregulator.com.
3. Zurn Industries, Inc: www.zurn.com.
4. Substitutions: See Section 01600 - Product Requirements.

B. Reduced Pressure Backflow Preventers:
1. ASSE 1013; bronze body with bronze internal parts and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.

C. Encase exterior cleanouts in concrete flush with grade.

D. Install floor cleanouts at elevation to accommodate finished floor.

E. Install approved portable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.

F. Pipe relief from backflow preventer to nearest drain.

G. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatories sinks washing machine outlets _____.

H. Install air chambers on hot and cold water supply piping to each fixture or group of fixtures (each washroom). Fabricate same size as supply pipe or 3/4 inch minimum, and minimum 18 inches long.

END OF SECTION

SECTION 22-1010

PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe, pipe fittings, valves, and connections for piping systems.
   1. Sanitary sewer.
   2. Domestic water.
   3. Gas.

1.02 REFERENCE STANDARDS

A. ANSI Z21.22 - American National Standard for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems; 1999, and addenda A&B (R2004).

B. ASME B16.3 - Malleable Iron Threaded Fittings; The American Society of Mechanical Engineers; 2011.

C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2012 (ANSI B16.18).

D. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2001 (R2010).

E. ASME B31.1 - Power Piping; The American Society of Mechanical Engineers; 2012 (ANSI/ASME B31.1).

F. ASME B31.9 - Building Services Piping; The American Society of Mechanical Engineers; 2011 (ANSI/ASME B31.9).

G. ASME (BPV IV) - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; The American Society of Mechanical Engineers; 2010.

H. ASME (BPV IX) - Boiler and Pressure Vessel Code, Section IX - Welding and Brazing Qualifications; The American Society of Mechanical Engineers; 2010.

I. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.

J. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2012.

K. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2011a.

L. ASTM B32 - Standard Specification for Solder Metal; 2008.

M. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2009.

N. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2005 (Reapproved 2011).

O. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2004 (Reapproved 2009).

P. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2012.

Q. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2011.

R. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings; 1996 (Reapproved 2010).

S. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2008.

T. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; American Water Works Association; 2010 (ANSI/AWWA C105/A21.5).

U. AWWA C651 - Disinfecting Water Mains; American Water Works Association; 2005 (ANSI/AWWA C651).

V. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2009.

W. MSS SP-67 - Butterfly Valves; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2011.

X. MSS SP-71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2011.

Y. MSS SP-78 - Cast Iron Plug Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2011.

Z. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2008.

AA. MSS SP-85 - Cast Iron Globe & Angle Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2011.

AB. NFPA 54 - National Fuel Gas Code; National Fire Protection Association; 2012.

1.03 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

C. Project Record Documents: Record actual locations of valves.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01600 - Product Requirements, for additional provisions.
   2. Valve Repacking Kits: One for each type and size of valve.

1.04 QUALITY ASSURANCE

A. Perform work in accordance with applicable codes.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

C. Welding Materials and Procedures: Conform to ASME (BPV IX) and applicable state labor regulations.

D. Welder Qualifications: Certified in accordance with ASME (BPV IX).

E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

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.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.06 FIELD CONDITIONS

A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 SEE ALSO CIVIL ENGINEER/SITE PLANS.

2.02 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. PVC Pipe: ASTM D2665 or ASTM D3034.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.03 SANITARY SEWER PIPING, ABOVE GRADE

A. PVC Pipe: ASTM D2729.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.04 WATER PIPING, ABOVE GRADE

A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), Drawn (H).

1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
2. Joints: ASTM B32, alloy Sn95 solder.

2.05 NATURAL GAS PIPING, BURIED WITHIN 5 FEET (1500 MM) OF BUILDING

A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
   1. Fittings: ASTM A234/A234M, wrought steel welding type.
   2. Joints: ASME B31.1, welded.
   3. Jacket: AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil (0.25 mm) polyethylene tape.

2.06 NATURAL GAS PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
   1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
   2. Joints: NFPA 54, threaded or welded to ASME B31.1.

2.07 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
   3. Trapeze Hangers: Welded steel channel frames attached to structure.
   4. Vertical Pipe Support: Steel riser clamp.
   5. Floor Supports: Concrete pier or steel pedestal with floor flange; fixture attachment.
   6. Rooftop Supports for Low-Slope Roofs: Steel pedestals with bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified; and as follows:
      a. Bases: High density polypropylene.
      b. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
      c. Steel Components: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
      d. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion resistant material.
      e. Height: Provide minimum clearance of 6 inches (150 mm) under pipe to top of roofing.

B. Plumbing Piping - Drain, Waste, and Vent:
   1. Hangers for Pipe Sizes 1/2 Inch (15 mm) to 1-1/2 Inches (40 mm): Malleable iron, adjustable swivel, split ring.
   2. Hangers for Pipe Sizes 2 Inches (50 mm) and Over: Carbon steel, adjustable, clevis.
   3. Wall Support for Pipe Sizes to 3 Inches (80 mm): Cast iron hook.
   4. Wall Support for Pipe Sizes 4 Inches (100 mm) and Over: Welded steel bracket and wrought steel clamp.
   5. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
   6. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

C. Plumbing Piping - Water:
   1. Hangers for Pipe Sizes 1/2 Inch (15 mm) to 1-1/2 Inches (40 mm): Malleable iron, adjustable swivel, split ring.
   2. Hangers for Cold Pipe Sizes 2 Inches (50 mm) and Over: Carbon steel, adjustable, clevis.
   3. Hangers for Hot Pipe Sizes 2 Inches (50 mm) to 4 Inches (100 mm): Carbon steel, adjustable, clevis.

2.08 GATE VALVES

A. Up To and Including 3 Inches (80 mm):
   1. MSS SP-80, Class 125, bronze body, bronze trim, rising stem, handwheel, inside screw, solid wedge disc, solder ends.

2.09 GLOBE VALVES

A. Up To and Including 3 Inches (80 mm):
   1. MSS SP-80, Class 125, bronze body, bronze trim, handwheel, bronze disc, solder ends.

2.10 FLOW CONTROLS

A. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.

B. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi psi (24 kPa kPa).

2.11 SPRING LOADED CHECK VALVES

A. Class 125, iron body, bronze trim, stainless steel springs, bronze disc, Buna N seals, wafer style ends.

2.12 WATER PRESSURE REDUCING VALVES

A. Up to 2 Inches (50 mm):
   1. MSS SP-80, bronze body, stainless steel and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded single union ends.

B. Over 2 Inches (50 mm):
   1. MSS SP-85, cast iron body, bronze fitted, elastomeric diaphragm and seat disc, flanged.

2.13 RELIEF VALVES

A. Pressure Relief:
   1. AGA Z21.22 certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.

B. Temperature and Pressure Relief:
   1. AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F (98.9 degrees C), capacity ASME (BPV IV) certified and labelled.

2.14 STRAINERS

A. Size 1-1/2 inch (40 mm) to 4 inch (100 mm):
   1. Class 125, flanged iron body, Y pattern with 1/16 inch (1.6 mm) stainless steel perforated screen.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

D. Install piping to maintain headroom, conserve space, and not interfere with use of space.

E. Group piping whenever practical at common elevations.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 15122.

G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 15082.

H. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 08310.

I. Install vent piping penetrating roofed areas to maintain integrity of roof assembly.

J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

K. Provide support for utility meters in accordance with requirements of utility companies.

L. Install bell and spigot pipe with bell end upstream.

M. Install valves with stems upright or horizontal, not inverted.

N. Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.

O. Install water piping to ASME B31.9.

P. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

Q. Pipe Hangers and Supports:
   1. Install in accordance with ASME B31.9.
   2. Install hangers to provide minimum 1/2 inch (15 mm) space between finished covering and adjacent work.
   3. Place hangers within 12 inches (300 mm) of each horizontal elbow.
   4. Use hangers with 1-1/2 inch (40 mm) minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   5. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
   6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
   7. Provide copper plated hangers and supports for copper piping.
   8. Provide hangers adjacent to motor driven equipment with vibration isolation; refer to Section 15072.
   9. Support cast iron drainage piping at every joint.

3.04 TOLERANCES

A. Water Piping: Slope at minimum of 1/32 inch per foot (1:400) and arrange to drain at low points.

3.05 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Prior to starting work, verify system is complete, flushed and clean.

B. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.

C. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.

D. Maintain disinfectant in system for 24 hours.

E. If final disinfectant residual tests less than 25 mg/L, repeat treatment.

F. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

G. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.06 SERVICE CONNECTIONS

A. Provide new water service complete with approved reduced pressure backflow preventer and water meter with by-pass valves, and sand strainer.

B. Provide new gas service complete with gas meter and regulators. Gas service distribution piping to have initial minimum pressure of 7 inch wg (1.75 kPa). Provide regulators on each line serving gravity type appliances, sized in accordance with equipment.

3.07 SCHEDULES

A. Pipe Hanger Spacing:
   1. Metal Piping:
      a. Pipe size: 1/2 inches (15 mm) to 1-1/4 inches (32 mm):
         1) Maximum hanger spacing: 6.5 ft (2 m).
         2) Hanger rod diameter: 3/8 inches (9 mm).
      b. Pipe size: 1-1/2 inches (40 mm) to 2 inches (50 mm):

1) Maximum hanger spacing: 10 ft (3 m).
2) Hanger rod diameter: 3/8 inch (9 mm).

c. Pipe size: 2-1/2 inches (65 mm) to 3 inches (75 mm):
1) Maximum hanger spacing: 10 ft (3 m).
2) Hanger rod diameter: 1/2 inch (13 mm).

d. Pipe size: 4 inches (100 mm) to 6 inches (150 mm):
1) Maximum hanger spacing: 10 ft (3 m).
2) Hanger rod diameter: 5/8 inch (15 mm).

2. Plastic Piping:
a. All Sizes:
1) Maximum hanger spacing: 6 ft (1.8 m).
2) Hanger rod diameter: 3/8 inch (9 mm).

END OF SECTION

SECTION 22-3100

PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water heaters.

1.02 REFERENCE STANDARDS

A. ANSI Z21.10.1 - Gas Water Heaters - Volume I - Storage Water Heaters with Input Ratings of 75,000 Btu per Hour or Less; 2011.

B. ANSI Z21.10.3 - Gas Water Heaters - Volume III - Storage Water Heaters with Input Ratings Above 75,000 Btu per Hour, Circulating and Instantaneous Water Heaters; 2011.

1.03 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittals procedures.

B. Product Data:
   1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
   2. Provide electrical characteristics and connection requirements.

C. Project Record Documents: Record actual locations of components.

D. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.

E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01600 - Product Requirements, for additional provisions.

1.04 CERTIFICATIONS

A. Water Heaters: NSF approved.

B. Electric Water Heaters: UL listed and labeled to UL 174 or UL 1453.

C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.06 WARRANTY

A. See Section 01780 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for domestic water heaters.

PART 2 PRODUCTS

2.01 WATER HEATER

A. Electric, Tankless/Instantaneous. Eemax Model #SP55. See Mechanical Engineer's plans and notes for product selections.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.

B. Coordinate with plumbing piping and related fuel piping and/or electrical work to achieve operating system.

END OF SECTION

SECTION 22-4000

PLUMBING FIXTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water closets.

B. Urinals.

C. Lavatories.

D. Service sinks.

E. Electric water coolers.

F. Eye and face wash fountains.

G. Emergency showers.

1.02 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design.

C. ANSI Z358.1 - American National Standard for Emergency Eyewash and Shower Equipment.

D. ASME A112.18.1 - Plumbing Supply Fittings; The American Society of Mechanical Engineers.

E. ASME A112.19.2 - Ceramic Plumbing Fixtures; The American Society of Mechanical Engineers.

F. NSF 61 - Drinking Water System Components - Health Effects.

G. NSF 372 - Drinking Water System Components - Lead Content.

1.03 SUBMITTALS

A. See Section 01-3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

C. Manufacturer's Instructions: Indicate installation methods and procedures.

D. Maintenance Data: Include fixture trim exploded view and replacement parts lists.

E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01-6000 - Product Requirements, for additional provisions.
2. Extra Faucet Washers: One set of each type and size.
3. Extra Lavatory Supply Fittings: One set of each type and size.
4. Extra Toilet Seats: One of each type and size.

1.04 REGULATORY REQUIREMENTS

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept fixtures on site in factory packaging. Inspect for damage.

B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.06 WARRANTY

A. Provide five year manufacturer warranty for electric water cooler.

PART 2 PRODUCTS

2.01 GENERAL

A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 TANK TYPE WATER CLOSETS

A. See Mechanical Engineer's plans and notes for product selections.

B. Tank Type Water Closet Manufacturers:
   1. American Standard, Inc; Model Cadet II; Model #2216.170: www.americanstandard-us.com.
   2. Substitutions: See Section 01-6000 - Product Requirements.

C. Seat Manufacturers:
   1. American Standard, Inc: www.americanstandard-us.com.
   2. Substitutions: See Section 01-6000 - Product Requirements.

D. Seat: Solid white plastic, open front, extended back, less cover, complete with self-sustaining hinge.

2.03 WALL HUNG URINALS

A. See Mechanical Engineer's plans and notes for product selections.

B. Wall Hung Urinal Manufacturers:
   1. American Standard, Inc; ALLBROOK Urinal: www.americanstandard-us.com.

C. Urinals: Vitreous china, ASME A112.19.2, wall hung with side shields and concealed carrier.
   1. Flush Volume: 1.0 gallon, maximum.
   2. Flush Valve: Exposed (top spud).
   3. Flush Operation: Sensor operated.
   4. Trap: Integral.
   5. Supply Size: 3/4 inch.
   6. Outlet Size: 2 inches.

D. Flush Valves: ASME A112.18.1, diaphragm type, complete with vacuum breaker stops and accessories.
   1. Sensor-Operated Type: Solenoid operator, low voltage hard-wired, infrared sensor and over-ride push button.
   2. Exposed Type: Chrome plated, escutcheon, integral screwdriver stop.
   3. Manufacturers:
      a. Sloan Valve Company; Model 186-1-DFB-SMO: www.sloanvalve.com.

2.04 LAVATORIES

A. See Mechanical Engineer's plans and notes for product selections.

B. Lavatory Manufacturers:
   1. American Standard, Inc; LUCERNE Wall-Mount Sink: www.americanstandard-us.com.
   2. Substitutions: See Section 01-6000 - Product Requirements.

C. Supply Faucet Manufacturers:
   1. American Standard, Inc; Model Heritage: www.americanstandard-us.com.
   2. Substitutions: See Section 01-6000 - Product Requirements.

D. Supply Faucet: ASME A112.18.1; chrome plated combination supply fitting with open grid strainer, water economy aerator with maximum flow of 2.2 gallons per minute, indexed handles.

E. Accessories:
   1. LavGuard/Truebro undersink piping covers; provide at all exposed piping below wall mounted lavatory. Model #103 White.

2.05 ELECTRIC WATER COOLERS

A. See Mechanical Engineer's plans and notes for product selections.

B. Electric Water Cooler Manufacturers:
   1. Elkay Manufacturing Company; Model EZS8WSLK: www.elkay.com.

C. Water Cooler: Electric, mechanically refrigerated; surface handicapped mounted; stainless steel top, vinyl on steel body, elevated anti-squirt bubbler with stream guard, automatic stream regulator, push button, mounting bracket; integral air cooled condenser and stainless steel grille.

2.06 SERVICE SINKS

A. See Mechanical Engineer's plans and notes for product selections.

B. Janitor's Sink (JAN): Advance-Tabco 7-PS-30; knee operated.

2.07 EMERGENCY SHOWERS

A. See Mechanical Engineer's plans and notes for product selections.

B. Emergency Shower Manufacturers:
   1. Haws Corporation; Model B300-B309, Axion MSR; floor mount: www.hawsco.com.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

B. Verify that electric power is available and of the correct characteristics.

C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.02 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.03 INSTALLATION

A. Install each fixture with trap, easily removable for servicing and cleaning.

B. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.

C. Install components level and plumb.

D. Install and secure fixtures in place with wall supports and bolts.

E. Seal fixtures to wall and floor surfaces with sealant as specified in Section 07-9005, color to match fixture.

F. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

3.04 INTERFACE WITH WORK OF OTHER SECTIONS

A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.05 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.06 CLEANING

A. Clean plumbing fixtures and equipment.

3.07 PROTECTION

A. Protect installed products from damage due to subsequent construction operations.

B. Repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 23-0001

DIVISION 23 - HVAC

SECTION 23-0910

INSTRUMENTS AND CONTROL ELEMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Thermostats.

1.02 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.

C. Shop Drawings: Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences. Submit schedule of valves indicating size, flow, and pressure drop for each valve. For automatic dampers indicate arrangement, velocities, and static pressure drops for each system.

D. Project Record Documents: Record actual locations of control components, including panels, thermostats, and sensors. Accurately record actual location of control components, including panels, thermostats, and sensors.

E. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner s name and registered with manufacturer.

PART 2 PRODUCTS

2.01 EQUIPMENT - GENERAL

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

2.02 THERMOSTATS

A. See Mechanical Engineer's plans and notes for product selections ('M' Sheets).

2.03 OTHER SENSORS

A. Exhaust Fan #2 is to be controlled by a manual switch located at Door #7, and a carbon monoxide sensor.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that systems are ready to receive work.

C. Beginning of installation means installer accepts existing conditions.

D. Sequence work to ensure installation of components is complementary to installation of similar components in other systems.

E. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Check and verify location of thermostats, humidistats, and exposed control sensors with plans and room details before installation. Locate 60 inches above floor. Align with lighting switches. Refer to Section 16140.

C. Provide conduit and electrical wiring in accordance with Section 16155. Electrical material and installation shall be in accordance with appropriate requirements of Division 16.

3.03 MAINTENANCE

A. Provide service and maintenance of control system for one year from Date of Substantial Completion.

B. Provide complete service of controls systems, including call backs, and submit written report of each service call.

C. In addition to normal service calls, make minimum of 2 complete normal inspections of approximately 2 hours duration to inspect, calibrate, and adjust controls.

END OF SECTION

SECTION 23-3150

DUCTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal ductwork.

B. Duct cleaning.

1.02 REFERENCE STANDARDS

A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals; 2009.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2011.

C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association; 2012.

D. SMACNA (DCS) - HVAC Duct Construction Standards; 2005.

1.03 SUBMITTALS

A. Shop Drawings: Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for HVAC systems.

B. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. See Mechanical Engineer's notes at sheet M-1.

1.05 FIELD CONDITIONS

A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 DUCT ASSEMBLIES

A. All Ducts: Galvanized steel, unless otherwise indicated.

B. Outside Air Intake: 1/2 inch w.g. pressure class, galvanized steel.

C. Combustion Air: 1/2 inch w.g. pressure class, galvanized steel.

2.02 MATERIALS

A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.

B. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
   1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
   2. VOC Content: Not more than 250 g/L, excluding water.
   3. Surface Burning Characteristics: Flame spread of zero, smoke developed of zero, when tested in accordance with ASTM E84.
   4. For Use With Flexible Ducts: UL labeled.

C. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

2.03 DUCTWORK FABRICATION

A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards and as indicated.

B. No variation of duct configuration or size permitted except by written permission. Size round duct installed in place of rectangular ducts in accordance with ASHRAE Handbook - Fundamentals.

C. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

D. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.

E. Provide turning vanes of perforated metal with glass fiber insulation when acoustical lining is indicated.

F. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

G. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA HVAC Duct Construction Standards.

H. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

2.04 MANUFACTURED DUCTWORK AND FITTINGS

A. Flexible Ducts: Two ply vinyl film supported by helically wound spring steel wire.
   1. Pressure Rating: 10 inches WG positive and 1.0 inches WG negative.
   2. Maximum Velocity: 4000 fpm.
   3. Temperature Range: -10 degrees F to 160 degrees F.
   4. Flexible duct runs shall not exceed 14 feet in length without prior approval of the Architect and Engineer.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install, support, and seal ducts in accordance with SMACNA HVAC Duct Construction Standards.

B. Install in accordance with manufacturer's instructions.

C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

D. Flexible Ducts: Connect to metal ducts with adhesive.

E. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.

F. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

G. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

H. Use double nuts and lock washers on threaded rod supports.

I. Connect terminal units to supply ducts directly or with one foot maximum length of flexible duct. Do not use flexible duct to change direction.

J. Connect diffusers or light troffer boots to low pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp.

K. At exterior wall louvers, seal duct to louver frame and install blank-out panels.

3.02 CLEANING

A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment that could be harmed by excessive dirt with temporary filters, or bypass during cleaning.

END OF SECTION

SECTION 23-3160

DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Duct insulation.

B. Duct Liner.

1.02 REFERENCE STANDARDS

A. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 1985 (Reapproved 2007).

B. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings; 2008.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2012.

D. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2009.

E. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.

F. SMACNA (DCS) - HVAC Duct Construction Standards; Sheet Metal and Air Conditioning Contractors' National Association; 2005.

G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

B. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.05 FIELD CONDITIONS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, NFPA 255, or UL 723.

2.02 GLASS FIBER, FLEXIBLE

A. Manufacturer:
   1. Knauf Insulation;www.knaufusa.com.
   2. Johns Manville Corporation; www.jm.com.
   3. Owens Corning Corp; www.owenscorning.com.
   4. CertainTeed Corporation; www.certainteed.com.
   5. Substitutions: See Section 01600 - Product Requirements.

B. Insulation: ASTM C553; flexible, noncombustible blanket.
   1. 'K' value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
   2. Maximum Service Temperature: 1200 degrees F.

3. Maximum Water Vapor Sorption: 5.0 percent by weight.

C. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
   3. Secure with pressure sensitive tape.

D. Vapor Barrier Tape:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

E. Outdoor Vapor Barrier Mastic:
   1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

F. Tie Wire: Annealed steel, 16 gage.

2.03 JACKETS

A. Mineral Fiber (Outdoor) Jacket: Asphalt impregnated and coated sheet, 50 lb/square.

2.04 DUCT LINER

A. Manufacturers:
   1. Knauf Insulation: www.knaufusa.com.
   2. Johns Manville Corporation: www.jm.com.
   3. Owens Corning Corp: www.owenscorning.com.
   4. CertainTeed Corporation: www.certainteed.com.

B. Insulation: Non-corrosive, incombustible glass fiber complying with ASTM C1071; rigid board and preformed round liner board; impregnated surface and edges coated with poly vinyl acetate polymer, or acrylic polymer.
   1. Fungi Resistance: ASTM G21.
   2. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F.
   3. Service Temperature: Up to 250 degrees F.
   4. Rated Velocity on Coated Air Side for Air Erosion: 5,000 fpm, minimum.

C. Adhesive: Waterproof, fire-retardant type, ASTM C916.

D. Liner Fasteners: Galvanized steel, self-adhesive pad with integral head.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that ducts have been tested before applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. Insulated ducts conveying air below ambient temperature:
   1. Provide insulation with vapor barrier jackets.
   2. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
   3. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

D. Insulated ducts conveying air above ambient temperature:
   1. Provide with or without standard vapor barrier jacket.
   2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.

E. Ducts Exposed in Mechanical Equipment Rooms or Finished Spaces (below 10 feet above finished floor): Finish with canvas jacket sized for finish painting.

F. Exterior Applications: Provide insulation with vapor barrier jacket. Cover with with calked aluminum jacket with seams located on bottom side of horizontal duct section.

G. External Duct Insulation Application:

1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
2. Secure insulation without vapor barrier with staples, tape, or wires.
3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

H. Duct and Plenum Liner Application:
1. Adhere insulation with adhesive for 90 percent coverage.
2. Secure insulation with mechanical liner fasteners. Refer to SMACNA HVAC Duct Construction Standards for spacing.
3. Seal and smooth joints. Seal and coat transverse joints.
4. Seal liner surface penetrations with adhesive.
5. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

END OF SECTION

SECTION 23-3350

DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air turning devices/extractors.

B. Duct access doors.

C. Duct test holes.

D. Flexible duct connections.

E. Volume control dampers.

1.02 REFERENCE STANDARDS

A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association; 2012.

B. SMACNA (DCS) - HVAC Duct Construction Standards; 2005.

1.03 SUBMITTALS

A. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.

B. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers.

C. Project Record Drawings: Record actual locations of access doors and test holes.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.01 AIR TURNING DEVICES/EXTRACTORS

A. Manufacturers:
   1. Krueger: www.krueger-hvac.com.
   2. Ruskin Company: www.ruskin.com.
   3. Titus: www.titus-hvac.com.

B. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.

2.02 DUCT ACCESS DOORS

A. Manufacturers:
   1. Acudor Products Inc: www.acudor.com.
   2. Nailor Industries Inc: www.nailor.com.
   3. Ruskin Company: www.ruskin.com.
   4. SEMCO Incorporated: www.semcoinc.com.
   5. Substitutions: See Section 01600 - Product Requirements.

B. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch thick insulation with sheet metal cover.
   1. Less Than 12 inches Square: Secure with sash locks.
   2. Up to 18 inches Square: Provide two hinges and two sash locks.
   3. Up to 24 x 48 inches: Three hinges and two compression latches with outside and inside handles.
   4. Larger Sizes: Provide an additional hinge.

C. Access doors with sheet metal screw fasteners are not acceptable.

2.03 DUCT TEST HOLES

A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.04 FLEXIBLE DUCT CONNECTIONS

A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards and as indicated.

B. Flexible Duct Connections: Fabric crimped into metal edging strip.

2.05 VOLUME CONTROL DAMPERS

A. Manufacturers:
   1. Nailor Industries Inc: www.nailor.com.
   2. Ruskin Company: www.ruskin.com.

B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards and as indicated.

C. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.

D. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.

E. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards. Refer to Section 15810 for duct construction and pressure class.

B. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide for cleaning kitchen exhaust ducts in accordance with NFPA 96. Provide minimum 8 x 8 inch size for hand access, size for shoulder access, and as indicated. Provide 4 x 4 inch for balancing dampers only. Review locations prior to fabrication.

C. Provide duct test holes where indicated and required for testing and balancing purposes.

D. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION

SECTION 23-3424
POWER VENTILATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall mounted exhaust fan

B. Vehicle Exhaust system

1.02 REFERENCE STANDARDS

A. AMCA 99 - Standards Handbook; Air Movement and Control Association International, Inc.; 2010.

B. AMCA 204 - Balance Quality and Vibration Levels for Fans; 2005.

C. AMCA 210 - Laboratory Methods of Testing Fans for Aerodynamic Performance Rating; Air Movement and Control Association International, Inc.; 2007 (ANSI/AMCA 210, same as ANSI/ASHRAE 51).

D. AMCA (DIR) - [Directory of] Products Licensed Under AMCA International Certified Ratings Program; Air Movement and Control Association International, Inc.; http://www.amca.org/certified/search/company.aspx.

E. AMCA 300 - Reverberant Room Method for Sound Testing of Fans; Air Movement and Control Association International, Inc.; 2008.

F. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; Air Movement and Control Association International, Inc.; 1990.

G. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 2011.

H. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2008.

I. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; National Fire Protection Association; 2011.

J. UL 705 - Power Ventilators; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

K. UL 762 - Outline of Investigation for Power Roof Ventilators for Restaurant Exhaust Appliances; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.

C. Manufacturer's Instructions: Indicate installation instructions.

D. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01600 - Product Requirements, for additional provisions.
   2. Extra Fan Belts: One set for each individual fan.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 FIELD CONDITIONS

A. Permanent ventilators may not be used for ventilation during construction.

B. Permanent ventilators may be used for ventilation during construction only after ductwork is clean, filters are in place, bearings have been lubricated, and fan has been test run under observation.

PART 2 PRODUCTS

2.01 POWER VENTILATORS - GENERAL

A. Static and Dynamically Balanced: AMCA 204 - Balance Quality and Vibration Levels for Fans.

B. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.

C. Sound Ratings: AMCA 301, tested to AMCA 300, and bearing AMCA Certified Sound Rating Seal.

D. Fabrication: Conform to AMCA 99.

E. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.

F. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

G. Enclosed Safety Switches: Conform to NEMA 250.

2.02 WALL EXHAUSTERS: EF-2

A. Twin City Model # BSI-330A; see Mechanical Equipment Schedule sheet M-1 for product specifications.

B. Performance Ratings:
   1. Air Flow: 12,000 cfm.
   2. Electrical Characteristics:
      a. 3 hp.
      b. 208 volts, three phase.

C. Fan Unit: V-belt or direct driven with spun aluminum housing; resiliently mounted motor; 1/2 inch mesh, 0.062 inch thick aluminum wire bird screen.

D. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor, and wall mounted multiple speed switch.

E. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked, and line voltage motor drive, power open, spring return.

F. Sheaves: For V-belt drives, provide cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

2.03 VEHICLE EXHAUST SYSTEM: EF-3

A. NSGV Model #122. See Mechanical Equipment Schedule sheet M-1 for product specifications.

B. Four drops; 23 feet of 4" flexible hose each, with spring operated hose reel.

C. Performance ratings:
   1. 1,200 cfm
   2. Electrical characteristics:
      a. 2 HP
      b. 208 volts, three phase

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide sheaves required for final air balance.

C. Install backdraft dampers on inlet to roof and wall exhausters.

END OF SECTION

SECTION 23-3710
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Diffusers.

B. Registers/grilles.

1.02 REFERENCE STANDARDS

A. SMACNA (DCS) - HVAC Duct Construction Standards; 2005.

1.03 SUBMITTALS

A. See Section 01300 - Administrative Requirements for submittal procedures.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. See Mechanical Engineer's plans and notes for product selections ('M-1' Sheet).

B. Titus: www.titus-hvac.com.

C. Substitutions: See Section 01600 - Product Requirements.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

C. Install diffusers to ductwork with air tight connection.

D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.

E. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 09900.

END OF SECTION

SECTION 23-5400

FORCED AIR FURNACES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Forced air furnaces.

B. Controls.

1.02 REFERENCE STANDARDS

A. ASHRAE Std 52.1 - Gravimetric and Dust-Spot Procedures for Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 1992.

B. NFPA 54 - National Fuel Gas Code; National Fire Protection Association; 2012.

C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association; 2012.

1.03 SUBMITTALS

A. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.

B. Shop Drawings: Indicate assembly, required clearances, and location and size of field connections.

C. Manufacturer's Instructions: Indicate rigging, assembly, and installation instructions.

D. Project Record Documents: Record actual locations of components and connections.

E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

F. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner s name and registered with manufacturer.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01600 - Product Requirements, for additional provisions.
   2. Extra Filters: One for each furnace.

1.04 REGULATORY REQUIREMENTS

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.05 WARRANTY

A. See Section 01780 - Closeout Submittals, for additional warranty requirements.

B. Provide three year manufacturers warranty for solid state ignition modules.

C. Provide five year manufacturers warranty for heat exchangers.

PART 2 PRODUCTS

2.01 GAS FIRED FURNACES

A. See Mechanical Engineer's plans and notes for product requirements.

B. Manufacturers:
   1. Lennox, Trane, Carrier are all acceptable.
   2. Substitutions: See Section 01600 - Product Requirements.

2.02 THERMOSTATS

A. Room Thermostat: Low voltage, electric solid state microcomputer based room thermostat:
   1. System selector switch (heat-off) and fan control switch (auto-on).
   2. Set-up for four separate temperatures per day.
   3. Instant override of setpoint for continuous or timed period from one hour to 31 days.
   4. Short cycle protection.
   5. Programming based on weekdays, Saturday and Sunday.
   6. Battery replacement without program loss.

7. Thermostat display:
    a. Actual room temperature.
    b. Programmed temperature.
    c. System mode indication: heating, cooling, fan auto, off, and on, auto or on, off.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.

B. Verify that proper power supply is available and located correctly.

C. Verify that proper fuel supply is available for connection.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions and requirements of authorities having jurisdiction.

B. Install in accordance with NFPA 90A.

C. Install gas fired furnaces in accordance with NFPA 54.

D. Provide vent connections in accordance with NFPA 211.

E. Pipe drain from humidifier to nearest floor drain.

END OF SECTION

SECTION 23-6215

AIR COOLED CONDENSING UNITS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 2010 (ANSI/ASHRAE Std 15).

B. ASHRAE Std 23.1 - Methods of Testing for Rating Positive Displacement Refrigerant Compressors and Condensing Units; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 2010.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2008.

1.02 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide rated capacities, weights specialties and accessories, electrical nameplate data, and wiring diagrams. Include equipment served by condensing units in submittal, or submit at same time, to ensure capacities are complementary.

C. Shop Drawings: Indicate components, assembly, dimensions, weights and loadings, required clearances, and location and size of field connections. Include schematic layouts showing condensing units, cooling coils, refrigerant piping, and accessories required for complete system.

D. Manufacturer's Instructions: Submit manufacturer's complete installation instructions.

E. Operation and Maintenance Data: Include start-up instructions, maintenance instructions, parts lists, controls, and accessories.

F. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01600 - Product Requirements, for additional provisions.
   2. Extra Lubricating Oil: One complete change.

1.03 QUALITY ASSURANCE

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

1.05 WARRANTY

A. See Section 01780 - Closeout Submittals, for additional warranty requirements.

B. Provide a five year warranty to include coverage for refrigerant compressors.

PART 2 PRODUCTS

2.01 SEE MECHANICAL ENGINEER'S PLANS AND NOTES FOR PRODUCT SELECTIONS.

2.02 MANUFACTURERS

A. See Mechanical Engineer's plans and notes for product selections (sheet 'M-1').

B. Lennox

C. Carrier Corporation; www.carrier.com.

D. Trane Inc; www.trane.com.

E. Substitutions: See Section 01600 - Product Requirements.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's installation instructions.

B. Complete structural, mechanical, and electrical connections in accordance with manufacturer's installation instructions.

C. Provide for connection to electrical service. Refer to Section 16155.

D. Install units on concrete base as recommended by manufacturer. Refer to Section 03300.

E. Provide connection to refrigeration piping system and evaporators. Comply with ASHRAE Std 15.

3.02 SYSTEM STARTUP

A. Supply initial charge of refrigerant and oil for each refrigeration system. Replace losses of oil or refrigerant prior to end of correction period.

B. Charge system with refrigerant and test entire system for leaks after completion of installation. Repair leaks, put system into operation, and test equipment performance.

C. Shut-down system if initial start-up and testing takes place in winter and machines are to remain inoperative. Repeat start-up and testing operation at beginning of first cooling season.

D. Provide cooling season start-up, and winter season shut-down for first year of operation.

E. Inspect and test for refrigerant leaks every 90 days during first year of operation.

END OF SECTION

SECTION 23-7413

PACKAGED OUTDOOR CENTRAL-STATION AIR-HANDLING UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Packaged roof top unit.

B. Unit controls.

1.02 REFERENCE STANDARDS

A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilation Systems; National Fire Protection Association.

1.03 SUBMITTALS

A. See Section 01-3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.

C. Shop Drawings: Indicate capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.

D. Manufacturer's Instructions: Indicate assembly, support details, connection requirements, and include start-up instructions.

E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

F. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01-6000 - Product Requirements, for additional provisions.
   2. Extra Filters: One set for each unit.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect units from physical damage by storing off site until roof mounting curbs are in place, ready for immediate installation of units.

1.06 WARRANTY

A. See Section 01-7800 - Closeout Submittals, for additional warranty requirements.

B. Provide a five year warranty to include coverage for refrigeration compressors.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. See Mechanical Engineer's product selection and requirements (Drawing Sheet M-1).

B. Carrier Corporation; _____: www.carrier.com.

C. Trane Inc; _____: www.trane.com.

D. See Mechanical Engineer's plans and notes for product selections.

E. Lennox.

2.02 MANUFACTURED UNITS

A. General: Roof mounted units having gas burner and electric refrigeration.

B. Description: Self-contained, packaged, factory assembled and prewired, consisting of cabinet and frame, supply fan, return fan, heat exchanger and burner, heat recovery coil, controls, air filters, refrigerant cooling coil and compressor, condenser coil and condenser fan.

C. Disconnect Switch: Factory mount disconnect switch in control panel.

2.03 FABRICATION

A. Cabinet: Steel with baked enamel finish, including access panels with screwdriver operated flush cam type fasteners. Structural members shall be minimum 18 gage, 0.0478 inch, with access doors or panels of minimum 20 gage, 0.0359 inch.

B. Heat Exchangers: Aluminized steel, of welded construction.

C. Supply and Return Fan: Forward curved centrifugal type, resiliently mounted with V-belt drive, adjustable variable pitch motor pulley, and rubber isolated hinge mounted high efficiency motor or direct drive as indicated. Isolate complete fan assembly. Refer to Section 22-0548.

2.04 BURNER

A. Gas Burner: Atmospheric type burner with adjustable combustion air supply, pressure regulator, gas valves, manual shut-off, intermittent spark or glow coil ignition, flame sensing device, and automatic 100 percent shut-off pilot.

B. Gas Burner Safety Controls: Energize ignition, limit time for establishment of flame, prevent opening of gas valve until pilot flame is proven, stop gas flow on ignition failure, energize blower motor, and after air flow proven and slight delay, allow gas valve to open.

2.05 EVAPORATOR COIL

A. Provide copper tube aluminum fin coil assembly with galvanized drain pan and connection.

B. Provide capillary tubes or thermostatic expansion valves for units of 6 tons capacity and less, and thermostatic expansion valves and alternate row circuiting for units 7.5 tons cooling capacity and larger.

2.06 COMPRESSOR

A. Provide hermetic compressors, 3600 rpm maximum, resiliently mounted with positive lubrication, crankcase heater, high and low pressure safety controls, motor overload protection, suction and discharge service valves and gage ports, and filter drier.

2.07 CONDENSER COIL

A. Provide copper tube aluminum fin coil assembly with subcooling rows and coil guard.

B. Provide direct drive propeller fans, resiliently mounted with fan guard, motor overload protection, wired to operate with compressor. Provide high efficiency fan motors.

2.08 OPERATING CONTROLS - SINGLE ZONE UNITS

A. Electric solid state microcomputer based room thermostat, located as indicated.

B. Room thermostat shall incorporate:
   1. Automatic switching from heating to cooling.
   2. Preferential rate control to minimize overshoot and deviation from set point.
   3. Instant override of set point for continuous or timed period from one hour to 31 days.
   4. Short cycle protection.
   5. Programming based on weekdays, Saturday and Sunday.
   6. Switch selection features including imperial or metric display, 12 or 24 hour clock, keyboard disable, remote sensor, fan on-auto.

C. Room thermostat display shall include:
   1. Actual room temperature.
   2. Programmed temperature.
   3. Programmed time.
   4. Duration of timed override.
   5. System model indication: heating, cooling, auto, off, fan auto, fan on.
   6. Stage (heating or cooling) operation.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that concrete ground pad (4" thick) is of proper dimensions and in the proper location before setting unit.

B. Verify that proper power supply is available.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NFPA 90A.

3.03 SYSTEM STARTUP

A. Prepare and start equipment. Adjust for proper operation.

3.04 CLOSEOUT ACTIVITIES

A. Demonstrate operation to Owner's maintenance personnel.

3.05 MAINTENANCE

A. Provide service and maintenance of packaged roof top units for one year year from Date of Substantial Completion.

B. Provide routine maintenance service with a two month interval as maximum time period between calls.

C. Include maintenance items as outlined in manufacturer's operating and maintenance data, including minimum of six filter replacements, minimum of one fan belt replacement, and controls check-out, adjustments, and recalibration.

D. Provide 24-hour emergency service on breakdowns and malfunctions.

E. After each service call, submit copy of service call work order or report that includes description of work performed.

END OF SECTION

SECTION 26-0001

DIVISION 26 - ELECTRICAL

SECTION 26-0518

BUILDING WIRE AND CABLE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single conductor building wire.

B. Metal-clad cable.

C. Wiring connectors.

D. Electrical tape.

E. Heat shrink tubing.

F. Oxide inhibiting compound.

1.02 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2001 (Reapproved 2007).

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010.

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2009).

E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2010.

F. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

G. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; National Electrical Manufacturers Association; 2009 (ANSI/NEMA WC 70/ICEA S-95-658).

H. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.

I. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.

K. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

L. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

M. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

N. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.

O. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

P. UL 854 - Service-Entrance Cables; Current Edition, Including All Revisions.

Q. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

B. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

C. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.07 FIELD CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Nonmetallic-sheathed cable is not permitted.

2.02 ALL CONDUCTORS AND CABLES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose indicated.

C. Provide new conductors and cables manufactured not more than one year prior to installation.

D. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

E. Comply with NEMA WC 70.

F. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

G. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

H. Conductor Material:
   1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
   2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
   3. Tinned Copper Conductors: Comply with ASTM B33.

I. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

J. Conductor Color Coding:
   1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
   2. Color Coding Method: Integrally colored insulation.
      a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
   3. Color Code:
      a. 240/120 V, 1 Phase, 3 Wire System:

1) Phase A: Black.
2) Phase B: Red.
3) Neutral/Grounded: White.

b. Equipment Ground, All Systems: Green.
c. Travelers for 3-Way and 4-Way Switching: Pink.
d. For control circuits, comply with manufacturer's recommended color code.

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Description: Single conductor insulated wire.

B. Conductor Stranding:
1. Feeders and Branch Circuits:
a. Size 10 AWG and Smaller: Solid.
b. Size 8 AWG and Larger: Stranded.
2. Control Circuits: Stranded.

C. Insulation Voltage Rating: 600 V.

D. Insulation:
1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
a. Size 4 AWG and Larger: Type XHHW-2.
b. Installed Underground: Type XHHW-2.
c. Fixture Wiring Within Luminaires: Type TFFN/TFN for luminaires with labeled maximum temperature of 90 degrees C; Approved suitable type for luminaires with labeled maximum temperature greater than 90 degrees C.

2.04 METAL-CLAD CABLE

A. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.

B. Conductor Stranding:
1. Size 10 AWG and Smaller: Solid.
2. Size 8 AWG and Larger: Stranded.

C. Insulation Voltage Rating: 600 V.

D. Insulation: Type as specified by engineer.

E. Grounding: Full-size integral equipment grounding conductor.

F. Armor: Steel, interlocked tape.

G. Provide PVC jacket applied over cable armor where indicated or required for environment of installed location.

2.05 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

2.06 WIRING ACCESSORIES

A. Electrical Tape:
1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.

B. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as shown on the drawings.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

A. Circuiting Requirements:
   1. Unless dimensioned, circuit routing indicated is diagrammatic.
   2. When circuit destination is indicated and routing is not shown, determine exact routing required.
   3. Arrange circuiting to minimize splices.
   4. Include circuit lengths required to install connected devices within 10 ft of location shown.
   5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.

B. Install products in accordance with manufacturer's instructions.

C. Install conductors and cable in a neat and workmanlike manner in accordance with NECA 1.

D. Exposed Cable Installation (only where specifically permitted):
   1. Route cables parallel or perpendicular to building structural members and surfaces.
   2. Protect cables from physical damage.

E. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
   1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.
   2. Installation in Vertical Raceways: Provide supports where vertical rise exceeds permissible limits.

F. Terminate cables using suitable fittings.
   1. Metal-Clad Cable (Type MC):
      a. Use listed fittings.
      b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.

G. Install conductors with a minimum of 12 inches of slack at each outlet.

H. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet of slack.

I. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

J. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
   2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
   3. Do not remove conductor strands to facilitate insertion into connector.
   4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.

K. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
   1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
   2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
   3. Wet Locations: Use heat shrink tubing.

L. Insulate ends of spare conductors using vinyl insulating electrical tape.

M. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07840.

N. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

A. Perform inspection, testing, and adjusting in accordance with Section 01400.

B. Inspect and test in accordance with NETA STD ATS, except Section 4.

C. Perform inspections and tests listed in NETA STD ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is required.

D. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

SECTION 26-0537

BOXES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

C. Boxes for hazardous (classified) locations.

1.02 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; National Electrical Contractors Association; 2010.

C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2012 (ANSI/NEMA FB 1).

D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; National Electrical Manufacturers Association; 2008 (Revised 2010) (ANSI/NEMA OS 1).

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2008.

F. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

I. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

J. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
6. Coordinate the work with other trades to preserve insulation integrity.
7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
8. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for outlet and device boxes, junction and pull boxes, cabinets and enclosures, and floor boxes.

B. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

C. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, cabinets and enclosures, floor boxes, and underground handhole enclosures.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:
   1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
   2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
   3. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) or testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated.
   4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
   5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
   1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
   2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
   3. Use suitable concrete type boxes where flush-mounted in concrete.
   4. Use raised covers suitable for the type of wall construction and device configuration where required.
   5. Use shallow boxes where required by the type of wall construction.
   6. Do not use "through-wall" boxes designed for access from both sides of wall.
   7. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
   8. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
   9. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
   10. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes.
   11. Wall Plates: Comply with Section 26-2725.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
   1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
   2. NEMA 250 Environment Type, Unless Otherwise Indicated:
      a. Indoor Clean, Dry Locations: Type 1, painted steel.
      b. Outdoor Locations: Type 3R, painted steel.
   3. Junction and Pull Boxes Larger Than 100 cubic inches:
      a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
   4. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.

D. Boxes for Hazardous (Classified) Locations: Listed and labeled as complying with UL 1203 for the classification of the installed location.

E. Floor Boxes:
   1. Description: Floor boxes compatible with floor box service fittings provided; with partitions to separate multiple services; furnished with all components, adapters, and trims required for complete installation.
   2. Use cast iron floor boxes within slab on grade.

3. Metallic Floor Boxes: Fully adjustable (with integral means for leveling adjustment prior to and after concrete pour).
4. Manufacturer: Same as manufacturer of floor box service fittings.

F. Underground Handhole Enclosures:
1. Description: In-ground, open bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel tamper resistant cover bolts.
2. Size: As indicated on drawings.
3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches.
4. Applications:
a. Sidewalks and Landscaped Areas Subject Only to Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77, Tier 8 load rating.
b. Parking Lots, in Areas Subject Only To Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77, Tier 15 load rating.
c. Do not use polymer concrete enclosures in areas subject to deliberate vehicular traffic.
5. Polymer Concrete Underground Handhole Enclosures: Comply with SCTE 77.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on drawings.

B. Verify that mounting surfaces are ready to receive boxes.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

E. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.

F. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.

G. Box Locations:
1. Locate boxes to be accessible. Provide access panels in accordance with Section 08310 as required where approved by the Architect.
2. Unless dimensioned, box locations indicated are approximate.
3. Locate boxes as required for devices installed under other sections or by others.
4. Locate boxes so that wall plates do not span different building finishes.
5. Locate boxes so that wall plates do not cross masonry joints.
6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
8. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
a. Concealed above accessible suspended ceilings.
b. Within joists in areas with no ceiling.
c. Electrical rooms.
d. Mechanical equipment rooms.

H. Box Supports:
1. Secure and support boxes in accordance with NFPA 70 and Section 16070 using suitable supports and methods approved by the authority having jurisdiction.

2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.

I. Install boxes plumb and level.

J. Flush-Mounted Boxes:
   1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
   2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
   3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.

K. Install boxes as required to preserve insulation integrity.

L. Metallic Floor Boxes: Install box level at the proper elevation to be flush with finished floor.

M. Underground Handhole Enclosures:
   1. Install enclosure on gravel base, minimum 6 inches deep.
   2. Flush-mount enclosures located in concrete or paved areas.
   3. Mount enclosures located in landscaped areas with top at 1 inch above finished grade.
   4. Provide cast-in-place concrete collar constructed in accordance with Section 03300, minimum 10 inches wide by 12 inches deep, around enclosures that are not located in concrete areas.
   5. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.

N. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

O. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07840.

P. Close unused box openings.

Q. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

R. Provide grounding and bonding in accordance with other section(s) of this project manual.

3.03 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

SECTION 26-2725

WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall switches.

B. Fan speed controllers.

C. Receptacles.

D. Wall plates.

E. Floor box service fittings.

1.02 REFERENCE STANDARDS

A. FS W-C-596 - Connector, Electrical, Power, General Specification for; Federal Specification; Revision G, 2001.

B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); Federal Specification; Revision F, 1999.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

D. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; 1999 (R 2005).

E. NEMA WD 6 - Wiring Device -- Dimensional Requirements; National Electrical Manufacturers Association; 2002 (R2008).

F. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.

H. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.

I. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.

J. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.

B. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.

C. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.

D. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.

E. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

C. Operation and Maintenance Data:
   1. GFI Receptacles: Include information on status indicators and testing procedures and intervals.

D. Project Record Documents: Record actual installed locations of wiring devices.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01600 - Product Requirements, for additional provisions.
   2. Extra Wall Plates: One of each style, size, and finish.
   3. Extra Flush Floor Service Fittings: Two of each type.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 DELIVERY, STORAGE, AND PROTECTION

A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hubbell Incorporated: www.hubbell-wiring.com.

B. Leviton Manufacturing Company, Inc: www.leviton.com.

C. Lutron Electronics Company, Inc: www.lutron.com.

D. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us

E. Substitutions: See Section 01600 - Product Requirements.

F. Source Limitations: Where possible, for each type of wiring device furnish products produced by a single manufacturer and obtained from a single supplier.

2.02 APPLICATIONS

A. Provide wiring devices suitable for intended use and with ratings adequate for load served.

B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.

C. Provide weather resistant GFI receptacles with specified weatherproof covers for all receptacles installed outdoors or in damp or wet locations.

D. Provide GFI protection for all receptacles installed within 6 feet of sinks.

E. Provide GFI protection for all receptacles serving electric drinking fountains.

F. Unless noted otherwise, do not use combination switch/receptacle devices.

2.03 ALL WIRING DEVICES

A. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

B. Finishes:
   1. Wiring Devices Installed in Finished Spaces: Beige with beige nylon wall plate unless otherwise indicated.
   2. Wiring Devices Installed in Unfinished Spaces: Gray with galvanized steel wall plate unless otherwise indicated.
   3. Wiring Devices Installed in Wet or Damp Locations: Beige with weatherproof cover unless otherwise indicated.

2.04 WALL SWITCHES

A. Manufacturers:
   1. Hubbell Incorporated: www.hubbell-wiring.com.
   2. Leviton Manufacturing Company, Inc: www.leviton.com.
   3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us

B. All Wall Switches: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.

C. Standard Wall Switches: Commercial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.05 FAN SPEED CONTROLLERS

A. Manufacturers:
   1. Leviton Manufacturing Company, Inc: www.leviton.com.
   2. Lutron Electronics Company, Inc; Maestro Series: www.lutron.com.
   3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us
   4. Substitutions: See Section 01600 - Product Requirements.

B. Description: 120 V AC, solid-state, full-range variable speed, slide control type with separate on/off switch, with integral radio frequency interference filtering, fan hum elimination circuitry, power failure preset memory, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 1917.
   1. Current Rating to control the load indicated in the plans.

2.06 RECEPTACLES

A. Manufacturers:
   1. Hubbell Incorporated: www.hubbell-wiring.com.
   2. Leviton Manufacturing Company, Inc: www.leviton.com.
   3. Lutron Electronics Company, Inc; Designer Style: www.lutron.com.
   4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us
   5. Source Limitations: Where wall controls are furnished as part of lighting control system as specified in Section 16575, provide accessory matching receptacles and wallplates by the same manufacturer in locations indicated.

B. All Receptacles: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
   2. NEMA configurations specified are according to NEMA WD 6.

C. Convenience Receptacles:
   1. Standard Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
   2. Weather Resistant Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R,, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.

D. GFI Receptacles:
   1. All GFI Receptacles: Provide with feed-through protection, light to indicate ground fault tripped condition and loss of protection, and list as complying with UL 943, class A.
      a. Provide test and reset buttons of same color as device.
   2. Standard GFI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
   3. Weather Resistant GFI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

2.07 WALL PLATES

A. Manufacturers:
   1. Hubbell Incorporated: www.hubbell-wiring.com.
   2. Leviton Manufacturing Company, Inc: www.leviton.com.
   3. Lutron Electronics Company, Inc: www.lutron.com.
   4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us
   5. Source Limitations: Where wall controls are furnished as part of lighting control system as specified in Section 16575, provide accessory matching receptacles and wallplates by the same manufacturer in locations indicated.

B. All Wall Plates: Comply with UL 514D.
   1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
   2. Size: Standard; .
   3. Screws: Metal with slotted heads finished to match wall plate finish.

C. Nylon Wall Plates: Smooth finish, high-impact thermoplastic.

D. Galvanized Steel Wall Plates: Rounded corners and edges, with corrosion resistant screws.

E. Weatherproof Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.

F. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

C. Verify that wall openings are neatly cut and will be completely covered by wall plates.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

E. Verify that core drilled holes for poke-through assemblies are in proper locations.

F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 16138 as required for installation of wiring devices provided under this section.
   1. Mounting Heights: Unless otherwise indicated, as follows:
      a. Wall Switches: 48 inches above finished floor.
      b. Receptacles: 18 inches above finished floor or 6 inches above counter.
   2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
   3. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
   4. Locate wall switches on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.

C. Install wiring devices in accordance with manufacturer's instructions.

D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.

F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.

G. Provide GFI receptacles with integral GFI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.

H. Install wiring devices plumb and level with mounting yoke held rigidly in place.

I. Install wall switches with OFF position down.

J. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.

K. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

L. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

3.04 FIELD QUALITY CONTROL

A. Perform field inspection, testing, and adjusting in accordance with Section 01400.

B. Inspect each wiring device for damage and defects.

C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.

D. Test each receptacle to verify operation and proper polarity.

E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.

F. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

B. Adjust presets for wall dimmers according to manufacturer's instructions as directed by Architect.

3.06 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

SECTION 26-2816

ENCLOSED CIRCUIT BREAKERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Enclosed circuit breakers.

1.02 REFERENCE STANDARDS

A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; Federal Specification; Revision D, 2006.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2008.

D. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

F. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for circuit breakers, enclosures, and other installed components and accessories.

B. Project Record Documents: Record actual installed locations of enclosed circuit breakers.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed circuit breaker internal components, enclosure, and finish.

1.06 FIELD CONDITIONS

A. Maintain ambient temperature between 23 degrees F and 104 degrees F during and after installation of enclosed circuit breakers.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Siemens Industry, Inc: www.sea.siemens.com.

B. Eaton Corporation; Cutler-Hammer Products; www.eaton.com.

C. General Electric Company: www.geindustrial.com.

D. Schneider Electric; Square D Products: www.schneider-electric.us.

E. Substitutions: See Section 01600 (01 6000) - Product Requirements.

2.02 ENCLOSED CIRCUIT BREAKERS

A. Description: Units consisting of molded case circuit breakers individually mounted in enclosures.

B. Provide products listed and labeled by Underwriters Laboratories Inc. as suitable for the purpose indicated.

C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:

1. Altitude: Less than 6,600 feet.
2. Ambient Temperature: Between 23 degrees F and 104 degrees F.

D. Short Circuit Current Rating:
1. Provide enclosed circuit breakers with listed short circuit current rating as indicated on the drawings.

E. Conductor Terminations: Suitable for use with the conductors to be installed.

F. Provide solidly bonded equipment ground bus in each enclosed circuit breaker, with a suitable lug for terminating each equipment grounding conductor.

G. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
1. Environment Type per NEMA 250: As indicated on the drawings.

H. Provide externally operable handle with means for locking in the OFF position.

2.03 MOLDED CASE CIRCUIT BREAKERS

A. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.

B. Interrupting Capacity:
1. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated.
2. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.

C. Conductor Terminations:
1. Lug Material: Copper, suitable for terminating copper conductors only.

D. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that the ratings of the enclosed circuit breakers are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive enclosed circuit breakers.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install enclosed circuit breakers where indicated, in accordance with manufacturer's instructions.

B. Install enclosed circuit breakers securely, in a neat and workmanlike manner in accordance with NECA 1.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide required supports in accordance with Section 16070 (26 0529).

E. Install enclosed circuit breakers plumb.

F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed circuit breakers such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.

G. Provide grounding and bonding in accordance with Section 16060 (26 0526).

H. Provide floor markings to clearly indicate required working clearances where indicated or where required by the authority having jurisdiction.

3.03 FIELD QUALITY CONTROL

A. Perform inspection, testing, and adjusting in accordance with Section 01400 (01 4000).

B. Inspect and test in accordance with manufacturer's instructions and NETA STD ATS, except Section 4.

C. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.

D. Test GFCI circuit breakers to verify proper operation.

E. Correct deficiencies and replace damaged or defective enclosed circuit breakers.

3.04 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.05 CLEANING

A. Clean dirt and debris from circuit breaker enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

3.06 SCHEDULE

A. See Panel Schedules and Power Riser Diagram on Sheet E-1 of plans

END OF SECTION

SECTION 26-5100

INTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior luminaires.

B. Emergency lighting units.

C. Exit signs.

D. Lamps.

1.02 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association.

B. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; National Electrical Contractors Association.

C. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; National Electrical Contractors Association.

D. NFPA 70 - National Electrical Code; National Fire Protection Association.

E. NFPA 101 - Life Safety Code; National Fire Protection Association.

F. UL 924 - Emergency Lighting and Power Equipment.

G. UL 1598 - Luminaires.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
4. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.

B. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

C. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01-6000 - Product Requirements, for additional provisions.
2. Extra Lenses and Louvers: Two percent of total quantity installed for each type, but not less than one of each type.
3. Extra Lamps: Five percent of total quantity installed for each type, but not less than two of each type.

E. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.06 DELIVERY, STORAGE, AND PROTECTION

A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.07 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.08 WARRANTY

A. See Section 01-7800 - Closeout Submittals, for additional warranty requirements.

B. Provide two year manufacturer warranty for all linear fluorescent ballasts.

C. Provide five year pro-rata warranty for batteries for emergency lighting units.

D. Provide ten year pro-rata warranty for batteries for self-powered exit signs.

PART 2 PRODUCTS

2.01 SEE ELECTRICAL ENGINEER'S PLANS, SCHEDULES AND NOTES FOR PRODUCT SELECTIONS (DRAWING SHEET E-1).

2.02 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

B. Substitutions: See Section 01-6000 - Product Requirements, except where individual luminaire types are designated with substitutions not permitted.

2.03 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.

F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

G. Fluorescent Luminaires:
   1. Provide ballast disconnecting means complying with NFPA 70 where required.
   2. Fluorescent Luminaires Controlled by Occupancy Sensors: Provide programmed start ballasts.

H. HID Luminaires:
   1. HID Luminaires with Quartz Restrike Systems: Factory-installed supplementary quartz lamp automatically switches on when power interruption causes primary HID lamp to drop out or during cold startup.

2.04 EMERGENCY LIGHTING UNITS

A. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.

B. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.

C. Battery:
   1. Size battery to supply all connected lamps, including emergency remote heads where indicated.

D. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.

E. Provide low-voltage disconnect to prevent battery damage from deep discharge.

F. Accessories:
   1. Provide compatible accessory mounting brackets where indicated or required to complete installation.

2.05 EXIT SIGNS

A. Description: Exit signs and similar signs for special purpose applications such as area of refuge/rescue assistance.

B. All Exit Signs: Internally illuminated with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
   1. Number of Faces: Single or double as indicated or as required for the installed location.
   2. Directional Arrows: As indicated or as required for the installed location.

C. Self-Powered Exit Signs:
   1. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
   2. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
   3. Provide low-voltage disconnect to prevent battery damage from deep discharge.

2.06 LAMPS

A. Manufacturers:
   1. General Electric Company/GE Lighting: www.gelighting.com.
   2. Osram Sylvania: www.sylvania.com.
   3. Philips Lighting Company: www.lighting.philips.com.
   4. Substitutions: See Section 01-6000 - Product Requirements.
   5. Manufacturer Limitations: Where possible, provide lamps produced by a single manufacturer.
   6. Where a specific manufacturer or model is indicated elsewhere in the luminaire schedule or on the drawings, substitutions are not permitted unless explicitly indicated.

B. Lamps - General Requirements:
   1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
   2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps per luminaire manufacturer's recommendations.
   3. Minimum Efficiency: Provide lamps complying with all current applicable federal and state lamp efficiency standards.
   4. Color Temperature Consistency: Unless otherwise indicated, for each type of lamp furnish products which are consistent in perceived color temperature. Replace lamps that are determined by the Architect to be inconsistent in perceived color temperature.

C. Linear Fluorescent Lamps: Wattage and bulb type as indicated, with base type as required for luminaire.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26-0537 as required for installation of luminaires provided under this section.

B. Install products according to manufacturer's instructions.

C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship), NECA 500 (commercial lighting), and NECA 502 (industrial lighting).

D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

E. Suspended Ceiling Mounted Luminaires:
   1. Do not use ceiling tiles to bear weight of luminaires.
   2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
   3. Secure surface-mounted luminaires to ceiling support channels or framing members or to building structure.

F. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.

G. Install accessories furnished with each luminaire.

H. Bond products and metal accessories to branch circuit equipment grounding conductor.

I. Emergency Lighting Units:
   1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.

J. Exit Signs:
   1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.

K. Install lamps in each luminaire.

3.04 FIELD QUALITY CONTROL

A. See Section 01-4000 - Quality Requirements, for additional requirements.

B. Inspect each product for damage and defects.

C. Operate each luminaire after installation and connection to verify proper operation.

D. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.

E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.05 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Architect or authority having jurisdiction.

C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

3.06 CLEANING

A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

A. See Section 01-7800 - Closeout Submittals, for closeout submittals.

B. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.

C. Just prior to Substantial Completion, replace all lamps that have failed.

3.08 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

SECTION 26-5650

EXTERIOR LUMINAIRES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior luminaires.

B. Lamps.

1.02 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

B. NECA/IESNA 501 - Recommended Practice for Installing Exterior Lighting Systems; 2006.

C. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 1598 - Luminaires; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Shop Drawings:
   1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

D. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01600 - Product Requirements, for additional provisions.
   2. Extra Lamps: Ten percent of total quantity installed for each type, but not less than two of each type.
   3. Extra Ballasts: Two percent of total quantity installed for each type, but not less than one of each type.

F. Project Record Documents: Record actual connections and locations of pole foundations, luminaires, and any pull or junction boxes.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

C. Receive, handle, and store wood poles in accordance with ANSI O5.1.

PART 2 PRODUCTS

2.01 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

C. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.

F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

G. Provide luminaires listed and labeled as suitable for wet locations unless otherwise indicated.

2.02 LAMPS

A. All Lamps:
   1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
   2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps per luminaire manufacturer's recommendations.
   3. Minimum Efficiency: Provide lamps complying with all current applicable federal and state lamp efficiency standards.
   4. Color Temperature Consistency: Unless otherwise indicated, for each type of lamp furnish products which are consistent in perceived color temperature. Replace lamps that are determined by the Architect to be inconsistent in perceived color temperature.

B. High Intensity Discharge (HID) Lamps: Wattage as indicated, with bulb type, burning position, and base type as required for luminaire.
   1. Metal Halide Lamps:
      a. Non-Reflector Type Metal Halide Lamps: Clear lamp finish unless otherwise indicated.
      b. Provide ANSI type O-rated protected metal halide lamps where required for open luminaires provided with compatible exclusionary sockets.
      c. Ceramic Metal Halide Lamps:
         1) Correlated Color Temperature (CCT): 3,000 K unless otherwise indicated.
         2) Color Rendering Index (CRI): Not less than 80.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 16138 as required for installation of luminaires provided under this section.

B. Install products according to manufacturer's instructions.

C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship) and NECA/IESNA 501 (exterior lighting).

D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

E. Install accessories furnished with each luminaire.

F. Bond products and metal accessories to branch circuit equipment grounding conductor.

G. Install lamps in each luminaire.

3.04 FIELD QUALITY CONTROL

A. See Section 01400 - Quality Requirements, for additional requirements.

B. Inspect each product for damage and defects.

C. Operate each luminaire after installation and connection to verify proper operation.

D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

E. Measure illumination levels at night with calibrated meters to verify conformance with performance requirements. Record test results in written report to be included with submittals.
   1. Test according to IESNA LM-64 (parking areas).

3.05 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

B. Luminaires with Field-Rotatable Optics: Position optics according to manufacturer's instructions to achieve lighting distribution as indicated or as directed by Architect.

3.06 CLEANING

A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.

B. Just prior to Substantial Completion, replace all lamps that have failed.

3.08 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

SECTION 32-0001

DIVISION 32 - SITE IMPROVEMENTS

SECTION 32 1713

PARKING BUMPERS

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 REFERENCES

A. Reference Standards:
   1. ASTM International:
      a. ASTM A185 / A185M-07, 'Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.'
      b. ASTM A615 / A615M-08b, 'Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.'
      c. ASTM C33 / C33M-08, 'Standard Specification for Concrete Aggregates.'
      d. ASTM C150-07, 'Standard Specification for Portland Cement.'

PART 2 - PRODUCTS

2.1 MATERIALS

A. Precast Concrete:
   1. Cement: ASTM C150, Type II.
   2. Aggregates: ASTM C33.

B. Reinforcing:
   1. Bars: ASTM A615, Grade 60.
   2. Reinforcing Mesh: ASTM A185.

C. Sealants:
   1. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
      a. 790 by Dow Corning Corp, Midland, MI www.dowcorning.com.
      b. Silpruf by GE Sealants & Adhesives, Huntersville, NC www.gesealants.com.

D. Pins: Galvanized steel pipe 3/4 inch (19 mm) diameter, 24 inches (610 mm) long.

2.2 FABRICATION

A. Precast Concrete Parking Bumpers:
   1. 3000 psi (20.68 MPa) concrete minimum.
   2. Chamfered edges.
   3. Smooth finish free from pits and rock pockets.
   4. Cast openings for pins.
   5. Cast in two bars, No. 3 minimum, full length of bumper less coverage requirements.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install level with paving and aligned with sidewalks.

B. Recess anchoring pins 1/2 inch (12.7 mm) below top of bumper. Install sealant in hole to top of bumper.

END OF SECTION

SECTION 32 1723

PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish material and apply pavement and curb markings as described in Contract Documents.

1.2 REFERENCES

A. Definitions:
   1. Reflectorization: Material, treatment or process to enable incident light to be returned in high proportions in the general direction of the light source.

B. Reference Standards:
   1. U.S. Department of Transportation Federal Highway Administration:
      a. Manual on Uniform Traffic Control Devices (MUTCD).

1.3 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:
   1. Paint handicap spaces to conform to ADA Standards and local code requirements.

1.4 FIELD CONDITIONS

A. Ambient Conditions:
   1. Apply only on dry surfaces, during favorable weather, and when damage by rain, fog, or condensation not anticipated.
   2. Latex Paint:
      a. Atmospheric temperature above 50 deg F (10 deg C).
      b. When temperature is not anticipated to drop below 50 deg F (10 deg C) during drying period.
   3. Alkyd or Chlorinated Rubber Paint:
      a. Atmospheric temperature above 40 deg F (4 deg C).
      b. When temperature is not anticipated to drop below 40 deg F (4 deg C) during drying period.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Paint:
   1. Non-reflectorized.
   2. Types:
      a. Acrylic Latex for uncured paving.
      b. Alkyd or chlorinated rubber for cured paving.
   3. Colors:
      a. White: Lane lines, edge lines, transverse lines, arrows, words, symbol markings, speed bump markings, parking space markings.

b. Yellow: Cross-hatching in medians, cross hatching in safety zones separating opposing traffic flows, crosswalk stripes, safety markings, centerlines, edge lines along the left edge of a one-way roadway or one way ramp.
c. Blue And White: In parking spaces specifically designated as reserved for the disabled.
d. Red: Fire lanes, no parking zones, special raised pavement markers that are placed to be visible to "wrong-way" drivers.

4. Type Two Acceptable Products:
   a. 442XX Traffic Marking Paint by ICI Devoe, Cleveland, OH www.devoepaint.com.
   b. Set-Fast Traffic Marking Paint by Sherwin-Williams, Cleveland, OH www.sherwin-williams.com.
   c. Equal as approved by Architect before application. See Section 01 6200.

PART 3 - EXECUTION

3.1 PREPARATION

A. Do not apply acrylic latex system until paving has cured 7 days minimum.

B. Do not apply alkyd or chlorinated rubber systems until paving has cured 3 months minimum.

C. Surfaces shall be dry and free of grease and loose dirt particles. Scrape and wire brush chipped or damaged paint on existing curbs.

D. Perform layout with chalk or lumber crayon only.

3.2 APPLICATION

A. Tolerances:
   1. General: Make lines parallel, evenly spaced, and with sharply defined edges.
   2. Line Widths:
      a. Plus or minus 1/4 inch (6 mm) variance on straight segments.
      b. Plus or minus 1/2 inch (13 mm) variance on curved alignments.

B. Coverage:
   1. Apply a single coat to parking lots which are being re-striped and where no surface treatments are being applied.
   2. Apply a single coat to an emulsion seal coat.
   3. Apply two coats to a slurry seal coat. Apply a single coat and then wait 30-45 days and after ravel sweeping to apply the second coat.
   4. Apply two coats to new parking lots and new overlays.
   5. Apply each coat at 150 sq ft (14 sq m) per gal.
   6. Apply second coat after three hours minimum or when first coat is thoroughly dried, whichever is longer.

3.3 CLEANING

A. Remove drips, overspray, improper markings, and paint material tracked by traffic by sand blasting, wire brushing, or other method approved by Architect before performance.

END OF SECTION

SECTION 32 3113

CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install complete fence and gates as described in Contract Documents.

B. Related Requirements:
   1. Section 03 3053: Mow strips at fencing and setting sleeves in retaining walls.
   2. Section 05 0503: Priming and galvanizing repair.
   3. Section 05 0523: Welding requirements.

1.2 REFERENCES

A. Reference Standards:
   1. ASTM International:
      a. ASTM A123 / A123M-08, 'Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.'
      b. ASTM A153 / A153M-05, 'Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.'
      c. ASTM A392-07, 'Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.'
      d. ASTM A1011 / A1011M-08, 'Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.'
      e. ASTM C1107 / C1107M-08, 'Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).'
      f. ASTM F1043-08, 'Standard Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework.'
      g. ASTM F1083-08, 'Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.'

1.3 SUBMITTALS

A. Action Submittals:
   1. Samples: Types of vision slats and colors for Architect's selection.

PART 2 - PRODUCTS

2.1 ASSEMBLIES

A. Materials:
   1. Fabric:
      a. Chain link fabric of 9 ga (3.7 mm) wire, galvanized before or after weaving with 1.2 ounce (34 grams) zinc coating conforming to requirements of ASTM A392, Class I.
      b. 2 inch (50 mm) square or 3-1/2 inch by 5 inch (89 mm by 125 mm) mesh as selected by Architect or as required by specified vision slat.
      c. Knuckle both selvages.
   2. Framework:

a. One cu ft cement, 2 cu ft (0.0566 cu m) sand, 4 cu ft (0.1132 cu m) gravel, and 5 gallons (18.93 liters) minimum to 6 gallons (22.71 liters) maximum water.
b. Mix thoroughly before placing.

2.2 ACCESSORIES

A. Post Setting Grout at Sleeves:
1. Commercial nonshrink grout conforming to requirements of ASTM C1107, Type B or C.
2. Type Two Approved Products:
a. Normal Construction Grout A by W R Bonsal, Charlotte, NC www.bonsal.com.
b. Advantage 1107 Grout by Dayton Superior, Miamisburg, OH www.daytonrichmond.com.
c. NS Grout by Euclid Chemical Co, Cleveland, OH www.euclidchemical.com.
d. 5 Star Special Grout 110 by Five Star Products Inc, Fairfield, CT www.fivestarproducts.com.
e. Duragrout by L&M Construction Chemicals Inc, Omaha, NE www.lmcc.com.
f. Masterflow 713 Pre-mixed Grout by Master Builders, Cleveland, OH www.masterbuilders.com.
g. Tamms Grout 621 by TAMMS Industries, Mentor, OH www.tamms.com.
h. U S Spec MP Grout by U S Mix Products Co www.usspec.com.
i. CG-86 Grout by W R Meadows, Elgin, IL www.wrmeadows.com.
j. Equal as approved by Architect before use. See Section 01 6200.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fence shall be installed by mechanics skilled and experienced in erecting fences of this type and in accordance with Contract Documents.
1. When general ground contour is to be followed, make changes of grade in gradual, rolling manner.
2. Evenly space posts in line of fence a maximum of 10 feet (3.050 meter) center to center.

B. Post Foundations:
1. Except atop retaining walls, set posts with concrete post foundations as specified below:
a. Line Posts Diameter 8 inches Depth 36 inches.
b. Gate, End, And Corner Posts Diameter 12 inches Depth 42 inches.
c. At mow strips, set top of post foundation below grade sufficient to allow for placing of mow strip. Measure post foundation depth from top of mow strip.
d. Where fences are incorporated into slabs, measure post foundation depth from top of slab. Extend bottom of slab footing sufficient to allow specified amount of concrete around post. At existing slabs, install fence outside perimeter of slab.
e. For fences on retaining walls, provide 12 inch (305 mm) long sleeves to be cast into retaining wall. Set pipe in sleeve and grout space between sleeve and post full.

C. Fence:
1. After posts have been permanently positioned and concrete cured for one week minimum, install framework, braces, and top rail. Join top rail with 6 inch (150 mm) minimum couplings at not more than 21 foot (6.40 meter) centers.
2. Stretch fabric by attaching one end to terminal post and supplying sufficient tension to other end of stretch so slack is removed.
a. Fasten fabric to line posts with tie wires. Pass ties over one strand of fabric and hook under line post flange.
b. Place one tie as close to bottom of fabric as is possible with additional ties equally spaced between top and bottom band on approximately equal spacing not to exceed 14 inches (355 mm) on center.
c. Attach fabric to roll formed terminals by weaving fabric into integral lock loops formed in post. Attach fabric to tubular terminals with tension bars and bands.

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Geotechnical Report

LIGHT FLEET VEHICLE MAINTENANCE BUILDING
HILLSBORO, MISSOURI

June 2014

JEFFERSON COUNTY DEPARTMENT OF PUBLIC WORKS
Owner

BACON COMMERICAL DESIGN, LLC
Architect

SCI No. 2014-5001.10

SCI ENGINEERING, INC.

CONSULTANTS IN DEVELOPMENT,
DESIGN AND CONSTRUCTION
GEOTECHNICAL
ENVIRONMENTAL
NATURAL RESOURCES
CULTURAL RESOURCES
CONSTRUCTION SERVICES

June 20, 2014

Mr. Jason Jonas
Director of Public Works
Jefferson County Department of Public Works
725 Maple Street
P.O. Box 100
Hillsboro, Missouri 63050

RE: Geotechnical Exploration
Light Fleet Vehicle Maintenance Building
Hillsboro, Missouri
SCI No. 2014-5001.10

Dear Mr. Jonas:

Attached is our *Geotechnical Report*, dated June 2014. It should be read in its entirety, and our recommendations applied to the design and construction of the project. Issues of concern include existing fill, expansive clay soils, and shallow bedrock. Selected excerpts from the report are highlighted below:

- Auger refusal occurred in all three borings at depths ranging from 6.3 to 10.8 feet (El. 830.5 to 839.6) below the existing ground surface on apparent bedrock. Rock excavation will be required based on the current proposed finished floor elevation.

- Existing fill was encountered in two of the three borings, ranging from approximately 3 feet to 5.5 feet (El. 835.8 to 842.9) below the existing ground surface. In order to eliminate all risk associated with the existing fill, it would need to be remediated.

- Potentially expansive fat clay soils were encountered in all three borings, and are likely present in other areas of the proposed building. These fat clay soils will require remediation if present within 3 feet of the bottom of the floor slab, or 2 feet below the bearing elevation of the footings.

- Shallow spread footing foundations bearing in remediated fat clay soils, or newly placed low plastic structural fill may be designed for maximum net allowable soil bearing pressures of 1,500 pounds per square foot (psf) for strip footings and 2,000 psf for isolated column footings, as discussed in the report. Footings bearing directly on competent bedrock may be sized for a maximum net allowable soil bearing pressure of 5,000 psf, as discussed in the report.

- Based on the soils encountered and the depth to apparent bedrock, Site Class C should be used for foundation design, with site coefficients of F_a = 1.17, F_v = 1.63, S_{DS} = 0.45 and S_{D1} = 0.19. The Seismic Design Category (SDC) for the site is C.

We appreciate the opportunity to be of service, and look forward to working with you during the construction phase of the project.

If you have any questions or comments, please call.

Respectfully,

SCI ENGINEERING, INC.

Hobson H. Fizette, P.E.
Staff Engineer

Thomas J. Casey, P.E.
Senior Engineer

HHF/TJC/tlw

Enclosure

C: Mr. Steven Bacon; Bacon Commercial Design, LLC (2)

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Geotechnical Report

LIGHT FLEET VEHICLE MAINTENANCE BUILDING
HILLSBORO, MISSOURI

1.0 INTRODUCTION

At the request of Mr. Jason Jonas of The Jefferson County Department of Public Works, SCI Engineering, Inc. (SCI) conducted a geotechnical exploration for the proposed project. The purpose of our exploration was to characterize and evaluate the subsurface conditions, provide recommendations for foundations, and address other geotechnical aspects. Our services were provided in general accordance with our proposal dated and authorized May 19, 2014, by Mr. Jonas.

2.0 SITE AND PROJECT DESCRIPTION

We understand that a new light fleet vehicle maintenance building is currently proposed at the Jefferson County Public Works Truck Maintenance Facility. The subject site is located south of the intersection of Highway B and Butcher Branch Road in Jefferson County, Missouri as shown on the *Vicinity and Topographic Map*, Figure 1.

Based on the preliminary plans provided by Bacon Commercial Design, LLC (BCD), the building will have dimensions of approximately 70 feet by 120 feet with a finished floor elevation of 841.0. The proposed location of the building is currently both a grass-covered area and a parking area with crushed rock, concrete, and asphalt pavement. The site is gently sloping with surface elevations ranging from approximately 845 to 839 feet across the proposed building area. There is also a small concrete retaining wall located near the proposed southeast corner of the proposed building footprint. The existing site features are shown on the *Aerial Photograph*, Figure 2.

Detailed grading plans were not available at the time of this report; however, based on the current grades and the proposed finished floor elevation, cuts of up to 4 feet and fills up to 2 feet are anticipated. The proposed construction is shown on the *Site Plan*, Figure 3.

Structural loads were not available at the time of this report; however, we anticipate that the building will be lightly loaded, with column loads of less than 60 kips and wall loads of less than 4 kips per lineal foot.

We have reviewed our *Geotechnical Report No. 2013-5001.10* dated May 10, 2013 that was completed on the same site immediately adjacent to the proposed structure. We have not reviewed, nor are we aware of, any other previous studies on this specific site, by SCI or others, that would affect the preparation of this report.

3.0 SUBSURFACE CONDITIONS

A total of three borings, denoted as B-101 to B-103, were drilled at the approximate locations shown on the *Site Plan*. Detailed information regarding the nature and thickness of the soils and rock encountered, and the results of the field sampling and laboratory testing are shown on the Boring Logs in Appendix A. The boring locations were selected by BCD and staked in the field by SCI personnel by measuring from existing site features. Ground surface elevations at the boring locations were later surveyed by Associated Land Surveyors, Inc. and the elevations provided to SCI by BCD.

3.1 Existing Fill

Existing fill was encountered in two of the three borings (B-102 and B-103) to depths ranging from approximately 3 feet to 5.5 feet (El. 835.8 to 842.9) below the existing ground surface, as further detailed in Table 3.1 below. In addition, approximately 5.5 inches of concrete with 3 inches of crushed rock was encountered in boring B-103. The fill was variable in consistency and generally consisted of fat clay (CH in accordance with the Unified Soil Classification System and ASTM D 2488-06), crushed stone (GP), lean clay (CL), clayey gravel (GC), silt (ML), and sand (SP). Within the fill layers, SPT N-values (the sum of the second and third blow counts in each SPT sampling interval) were variable and ranged from 6 to 17 blows per foot (bpf), with an average of 12 bpf. To assess the volume change characteristics of the fill soils, an Atterberg limits test was performed on a sample from boring B-102, which resulted in a liquid limit of 63 with a corresponding plasticity index of 42. The results of the Atterberg limits test classify the soil as fat clay (CH).

Table 3.1 – Summary of Existing Fill Elevations

Location	Boring Elevation (ft)	Fill Depth (ft)	Bottom of Fill Elevation (ft)
B-101	845.9	--	--
B-102	846.6	3.0	843.6
B-103	841.3	5.5	835.8

3.2 Natural Soils

Below the existing fill soils, the natural soils generally consisted of fat clay (CH) containing varying amounts of chert and sandstone gravel to depths of approximately 5.5 to 9.8 feet (El. 831.5 to 840.4), where either auger refusal or weathered sandstone was encountered. To assess the volume change characteristics of the natural soils, Atterberg limits tests were performed on samples from borings B-101 and B-103, which resulted in a liquid limit of 96 to 117 with corresponding plasticity indices of 58 to 77, respectively. The results of the Atterberg limits tests classify the soils as fat clays (CH). Moisture contents within the natural soils ranged from 20 to 55 percent, with an average of 43 percent. Within the natural soils, SPT N-values ranged from 9 to 37 bpf, averaging 19 bpf.

3.3 Bedrock

The Bedrock Geologic Map of the area, as provided by the University of Missouri – Columbia Center for Agricultural, Resource, and Environmental Systems (MO CARES) website, indicates that bedrock at the site is of the Ordovician Age and features the Power, Cotter, & Jefferson City Dolomite. This rock is typically light to dark tan, fine-grained, crystalline dolomite with some rare thin beds of sandstone, shale, and oolitic chert.

Weathered sandstone was encountered at depths of 5.5 and 9.8 feet (840.4 and 831.5) and extended down to auger refusal depths of 6.3 (El. 839.6) and 10.8 (El. 830.5) in borings B-101 and B-103. Weathered rock was not encountered in boring B-102 before auger refusal occurred at a depth of 8 feet (El. 838.6). Auger refusal is a designation applied to any material that cannot be further penetrated by the power auger without extraordinary effort, and is indicative of a very hard or very dense material, usually boulders or bedrock. A summary of the weathered bedrock and auger refusal depths is provided in Table 3.2 below.

Table 3.2 – Summary of Bedrock Elevations

Location	Boring Elevation (ft)	Weathered Bedrock Depth (ft)	Weathered Bedrock Elevation (ft)	Apparent Bedrock Depth (ft)	Apparent Bedrock Elevation (ft)
B-101	845.9	5.5	840.4	6.3	839.6
B-102	846.6	--	--	8.0	838.6
B-103	841.3	9.8	831.5	10.8	830.5

3.4 Karstic Activity

Due to the geologic setting, and our experience with projects in Jefferson County, there is a potential for sinkhole development throughout the project site. In general, sinkholes are formed when groundwater dissolves a portion of the limestone bedrock, usually where it travels along fractures in the rock. During our review of available map data on the MO CARES website, karstic bedrock was not observed within the project area, or within a one-mile radius of the subject site. During our site reconnaissance, we did not observe any evidence of sinkholes or other karstic features. Additionally, our borings did not reveal any buried rubble or organics which are commonly found in filled sinkholes.

3.5 Groundwater

Groundwater was not noted at the time of drilling in any of the borings. The groundwater level depends on seasonal and climatic variations, and may be present at different depths in the future. In addition, without extended periods of observation, accurate groundwater level measurements may not be possible, particularly in low permeability soils.

3.6 Subsurface Mining Activity

The MO CARES website maintains records of active and abandoned mines in the state. Based on their records, the site is not undermined and does not have any documented underground or surface mining of coal or other materials. The nearest mapped mine is approximately 1.5 miles north/northeast of the subject site. In consideration of this information, there appears to be little, if any, risk of subsidence related to collapse of an underground mine or settlement of fill of a backfilled abandoned surface mine.

4.0 DESIGN RECOMMENDATIONS

There are three main concerns with constructing the footings for this project: the relatively shallow nature of the underlying bedrock, the presence of existing fill (of unknown quality control effort), and the existing fat clay soils. These concerns and associated recommendations are discussed in more detail in the following sections.

4.1 Shallow Bedrock

Based on the provided finished floor elevation, bedrock will be encountered during footing excavation for a portion of the structure. Since bedrock will be encountered within a portion of the building foundation excavations, all of the foundations should be extended down to bear on competent bedrock. Or, an alternative would be to maintain at least 2 feet of soil below all foundations, even if this requires

excavating rock from below the bearing elevation and replacing it with compacted earth fill. This will allow all the foundations for the structure to bear on material of similar subgrade characteristics, and reduce the possibility of the foundation cracking due to differential movement.

Although not characterized by rock coring, we anticipate that most, if not all, of the apparent bedrock encountered below our auger refusal depths will require rock removal methods such as chipping. If blasting is required at the site, it should be controlled to keep peak velocities at the existing structures and property lines to less than 2 inches per second, unless local ordinances require more stringent criteria. Velocities greater than this could cause damage. A pre-blast survey of adjacent structures is recommended; and vibration monitoring during blasting operations is advisable, particularly until the amount of explosives to be used is determined. Blasts using small amounts of explosives or number of delays should be considered to reduce blasting damage.

The depth to rock may be encountered at deeper or shallower depths than those observed in the soil borings. In addition, attention should be given to the depth of below grade utilities in relation to the top of rock as presented on the soil boring logs in Appendix A.

4.2 Existing Fill

Existing fill was encountered in two of the borings to depths ranging from approximately 3 feet to 5.5 feet (El. 835.8 to 842.9) below the existing ground surface, and could be present in other areas of the proposed structure. Presently, there are no records to document that the existing fill encountered across the site was placed and compacted in a controlled manner. In addition, the fill contains expansive fat clay soils. Based on present knowledge of the site, the engineering properties and performance of the existing fill cannot be predicted with certainty. The disposition of the fill could vary significantly between the boring locations across the site. As a result, there is some risk of potential settlement or other performance problems if the foundations or floor slabs are supported on the fill material. In order to totally eliminate this risk, all of the existing fill would have to be remediated. It is recommended that where the existing fill underlie the foundations and floor slabs, that the fill be excavated and remediated, or replaced with fill materials as described in section 5.2 of this report.

4.3 Expansive Clays

Expansive fat clay soils were encountered across the building footprint and extended down to top of bedrock. Based on the results of the Atterberg limits tests, and our experience with clays of a similar nature, we anticipate that remediation of the fat clay soils will be required. Where the bearing soils

consist of fat clay, we recommend that they be removed to minimum depths of 2 feet beneath the bearing level of the footings, and three feet beneath the bottom of the floor slab. The overexcavation should extend at least 2 feet beyond the outside edge of the footings and building footprint to facilitate uniform compaction of the replacement materials, and may require additional widening at the building corners to allow equipment access for proper compaction. The overexcavation should be backfilled with properly compacted low plastic soil or 1-inch minus limestone. As an alternate, the footing over excavation may be backfilled with lean concrete. With this option, widening the footing excavation is not required. The footings and floor slab would then be constructed on the newly placed fill.

As an alternate to overexcavation and replacement, the fat clay soils may be remediated by the addition of lime in combination with a recompaction operation. If lime stabilization is performed, we recommend thoroughly mixing in "Code L" (a locally available calcium by-product also known as lime kiln dust) at a rate of approximately 10 percent, to the depths and lateral limits described in the preceding paragraph. Additional mix designs should be performed to determine the required amount of lime that will be required for remediation if this option is chosen. Water may be needed during mixing to allow for proper hydration of the lime. Pulverizing and tilling equipment, such as "gators" are preferred for mixing the lime into the soil. The treated soil would then be placed in compacted lifts as discussed in the "Fill Materials and Compaction" section of this report.

The methods of treatment described above are based on generally accepted standards in the local engineering community; however, swell pressures and volume change potential greater than can be mitigated by these methods may exist. Consequently, the owner should recognize that there is an inherent, but reduced risk that foundation and floor slab damage may occur, even after remedial treatment of the subgrade soil.

4.4 Seismic Considerations

Ground shaking at the foundation of structures and liquefaction of the soil under the foundation are the principle seismic hazards to be considered in design of earthquake-resistant structures. Liquefaction occurs when a rapid buildup in water pressure, caused by the ground motion, pushes sand particles apart, resulting in a loss of strength and later densification as the water pressure dissipates. This loss of strength can cause bearing capacity failure while the densification can cause excessive settlement. Potential earthquake damage can be mitigated by structural and/or geotechnical measures or procedures common to earthquake resistant design.

4.4.1 Design Earthquake

According to International Building Code (IBC 2009), structures such as those proposed for this project are required to be designed to a design earthquake with a 2 percent Probability of Exceedance (PE) over a 50-year exposure period (i.e. a 2,475-year design earthquake). The 2,475-year design earthquake has a Moment Magnitude (Mw) of 7.7 and a Peak Ground Acceleration (PGA) of 0.18g, as determined from data provided by the IBC 2009 and the United States Geological Survey (USGS) National Seismic Hazard Mapping Project.

4.4.2 International Building Code Site Classification

Based on procedures outlined in the IBC 2009, the American Society of Civil Engineers Minimum Design Loads for Buildings and other Structures (ASCE 7), and our geotechnical explorations for the subject site as a whole, the site can be classified as Site Class C for foundation design. Using the procedures outlined in Section 1613 of the IBC 2009, the calculated parameters for the site are as follows: $F_a = 1.17$, $F_v = 1.63$, $S_{DS} = 0.45$ and $S_{D1} = 0.19$. The Seismic Design Category (SDC) for the site is C.

4.4.3 Liquefaction Potential Analysis

The liquefaction potential analysis for the site was conducted using data from the field exploration and laboratory test results and the techniques outlined in the National Center for Earthquake Engineering (NCEER) Technical Report NCEER-97-0022.

Based on our analyses, the soils at the project site have sufficient strength values to resist liquefaction and/or a plasticity index that make the threat of liquefaction minimal during the design earthquake. While the amount of the seismically induced settlement is dependent on the magnitude and distance from the seismic event, we estimate that the settlements from the design earthquake will be negligible and relatively uniform in nature so liquefaction mitigation techniques are not required.

4.5 Shallow Foundations

Shallow spread footing foundations bearing in newly placed low plastic structural fill, remediated fat clay, remediated fill, or competent bedrock are appropriate for support of the proposed structure. Based on the soils encountered during our exploration, shallow foundations can be sized for maximum net allowable bearing pressures of 1,500 pounds per square foot (psf) for continuous wall footings, and 2,000 psf for isolated column footings. Footings bearing directly on competent bedrock may be sized for a maximum

net allowable bearing capacity of 5,000 psf. We anticipate that some localized areas of inadequate bearing materials may be encountered during construction; therefore, we recommend that an allowance be made in the construction budget for selected footing overexcavations.

Exterior footings and foundations in unheated areas of the buildings should be provided with at least 30 inches of soil cover for frost protection. Interior footings in heated areas can be located at nominal depths below the finished floor. For footings designed and constructed in accordance with our recommendations, total settlement should be less than 1 inch, and differential settlement between adjacent footings should be less than ¾ inch.

4.6 Floor Slabs

We recommend that the floor slabs be designed using a modulus of subgrade reaction (k) of 150 pci if bearing on compacted fill materials as described in section 5.2. Floor slabs should be supported on a minimum 4-inch-thick layer of crushed stone. This will help to distribute concentrated loads and equalize moisture conditions beneath the slab.

It is generally preferable to maintain structural separation between the floor slab and the foundation walls and column pads using isolation joints. We also suggest that joints be placed in the floor slabs on no more than 15-foot intervals in any direction. Such joints permit slight movements of the independent elements and help reduce random cracking that might otherwise be caused by restraint of shrinkage, slight rotations, heave, or settlement.

We recommend that 6-mil-thick polyethylene sheeting be placed immediately beneath the floor slab and above the crushed rock or gravel, to reduce the transfer of capillary moisture to the slab. However, without careful attention to curing of the floor slab, the polyethylene sheeting can cause excessive shrinkage cracking and "curling."

4.7 Below-Grade Walls

Below-grade walls required at this site may include retaining walls designed to accommodate surface grade changes around the building and paved areas. The maximum toe pressure for below-grade walls should not exceed the bearing pressure previously given for continuous strip footings. Retaining walls may be designed with an allowable coefficient of friction between the base of the concrete footing and the soil subgrade of 0.3, or 0.5 if founded on competent bedrock.

Below-grade walls should also be designed to withstand lateral earth pressures caused by the weight of the backfill, including slopes behind the walls; and any surcharge, such as adjacent floor or traffic loads. We recommend the equivalent fluid unit weights tabulated below for lateral earth pressures, in pounds per cubic foot (pcf), be used in the design of below-grade walls. The indicated values assume that drainage is provided to prevent buildup of hydrostatic pressure. Fat clay soils should not be used to backfill the wall excavations. Values for granular material should only be used if the granular backfill extends upwards and outwards the full height of the wall at a slope of 45 degrees or flatter from its base. In this case, exterior granular backfill should be capped with approximately 2 feet of cohesive soil to reduce the potential for surface water infiltration into the granular backfill. With clean granular backfill, filter fabric, such as Mirafi 140N, should be placed along the interface between the soil and granular backfill to reduce the potential for infiltration of the soil into the granular material.

Table 4.1 - Recommended Lateral Earth Pressures

Backfill Type	Equivalent Fluid Unit Weights
	Active Earth Pressures (pcf)
Cohesive Soil	50
Granular Material (1-inch minus)	40
Free-Draining Granular Material (1-inch clean)	30

Active earth pressures should be used for walls where the base remains fixed and deflection at the top of the wall of approximately 1 inch for each 10 feet of wall height is allowed, such as a retaining wall.

The above values are applicable when the surface of the backfill behind the wall is horizontal. Upward sloped or loaded backfill will result in increased values. In addition to lateral earth pressures, below-grade walls should be designed to resist any surcharge loads, including shallow building foundations and traffic. These surface loads can be modeled as uniform lateral loads, equivalent to one-half of the surface load, acting at the halfway point on the wall.

A passive soil resistance modeled by an equivalent fluid unit weight of 250 pcf may be used for natural soil against the face of the exterior base or a key below the base of the wall. The upper 2 feet of soil backfilled against the exterior face of the walls and uncontrolled backfill soils should be ignored when calculating the lateral resistance. Lower passive pressure should be used if the ground surface slopes downward away from the face of the wall.

We recommend that all below-grade walls be provided with a drainage system. A minimum 4-inch diameter, perforated drainpipe should be used, and placed at foundation level. Granular drainage material, consisting of 1-inch clean crushed rock, classified as GP by ASTM D 2487, with less than 5 percent of the rock passing the No. 200 sieve, should be placed a minimum of 6 inches in all directions around the drainage pipe. Synthetic filter fabric, such as Mirafi 140N or equivalent, should encapsulate the drainpipe and granular drainage material. The pipe should be sloped to drain by gravity or through weepholes located on approximately 10-foot centers for above-grade retaining walls, or to a sump with a pump for below-grade walls where drainage by gravity cannot be achieved. Alternately, drainage can be provided directly through the weepholes without a drain pipe, provided that filter fabric is used or other measures are taken to prevent the granular backfill from migrating out through the weepholes. Any interior sumps must be isolated "watertight" from the interior subgrade to prevent the movement of moisture from the sump into the underlying soils.

When information is available regarding specific wall locations, configurations, and heights, SCI should be retained to evaluate global stability, based on developed strength parameters for the subsurface soils and backfill. At your request, we can provide the global stability study, or we can work with your wall designer to provide coordinated internal and global stability studies. These services are beyond our current scope.

4.8 Site Grading and Drainage

Site drainage should be provided to reduce surface water infiltration around the perimeter of the buildings and beneath the floor slabs. All grades should be sloped away from the buildings. Roof and surface drainage should be collected and discharged such that water is not permitted to infiltrate the backfill of the buildings.

Large trees and shrubs should be planted away from exterior footings as they may cause drying and shrinkage of the foundation soils and, with the passage of time, potentially detrimental settlement of the building floor slabs and foundations. A minimum distance of 20 feet or the mature tree's dripline, whichever is greater, is suggested.

Detailed grading plans were not available at the time of this report. However, we recommend that all final slopes have a maximum inclination of 3 horizontal to 1 vertical (3H:1V), and that a crest of at least 10 feet in width or a distance equivalent to the total height of the slope, whichever is less, be provided

around the building before the surface slopes down and away. Once final grading plans have been established, SCI should be retained to review the proposed slopes to determine if additional analyses or recommendations are required.

4.9 Underground Utilities

Underground utilities can provide a pathway for water to migrate below the floor slab. Drain and utility pipes beneath floors should have tight joints to prevent leakage. If utility excavations are backfilled with free-draining granular materials, then cutoffs should be provided at the exterior walls to reduce the potential for water to migrate beneath the building. Impermeable cutoffs may consist of a 3-foot-long "plug" of cohesive soil or bentonite soil mix, or a 1-foot-long plug of lean concrete. Soil may be used for the balance of the backfill.

With the exception of individual service lines to the buildings that intersect foundations perpendicularly, below-grade utilities should not be located within the stress influence zone of the building foundations. Accordingly, below-grade utilities should be located outside a zone extending 45 degrees downward and outward from the edge of the footings.

5.0 SITE DEVELOPMENT AND CONSTRUCTION CONSIDERATIONS

5.1 Site Preparation

Areas to be cut or to receive fill should be stripped of any surface vegetation or existing pavements. After stripping, the site should be proofrolled by systematically passing over the subgrade to achieve complete coverage with proper compaction or loaded construction equipment, and observing the subgrade for pockets of excessively soft, wet, or disturbed soil, or otherwise unacceptable materials. Soft areas or otherwise unacceptable materials, if encountered, should be removed and replaced with structural fill or stabilized prior to placing additional fill. If removal of soft soils is impractical due to their excessive depth, they should be stabilized or "bridged over" in a manner approved by SCI.

Natural slopes to receive fill which are steeper than 5H:1V should be benched prior to the placement of fill. Benching will provide level surfaces for compaction and reduce the potential for development of inclined planes of weakness between the natural soil and compacted fill. The benches should be spaced such that the height of the cut at the up-slope end of the bench is less than 5 feet.

5.2 Fill Materials and Compaction

Prior to fill placement and compaction, the upper 8 inches of the exposed subgrade should be scarified, moisture conditioned, and recompacted. Structural fill should be placed in maximum 8-inch-thick loose lifts and mechanically compacted to at least 90 percent of its modified Proctor maximum dry density (ASTM D 698). Aggregate base course should be compacted to at least 95 percent modified Proctor. We recommend that any fill placed in building areas have a liquid limit less than 45 and a plasticity index less than 25. If higher plasticity soils are placed within 3 feet of the floor slab subgrade, or 2 feet of the bottom of the footings, then remediation will be required. Acceptable non-organic fill soils include materials designated CL, ML, CL-ML, GC, GP, and GW by ASTM D 2487. Masonry rubble and pavement broken to less than 4 inches in maximum dimension may be used as fill, if properly blended with acceptable soil and placed as approved by SCI.

Prior to compaction, the soil may require moisture adjustment. During warm weather, moisture reduction can generally be accomplished by disking or otherwise aerating the soil. When air drying is not feasible, a moisture reducing chemical additive, such as hydrated lime, could be incorporated into the soil. During dry weather, some addition of moisture may be required to facilitate compaction. This should also be done in a controlled manner using a tank truck with a spray bar. The moistened soil should be thoroughly blended with a disk or pulverizer to produce a uniform moisture content. If construction is performed during the winter season, fill materials should be carefully observed to see that no frozen soil is placed as fill or remains in the base materials upon which fill is placed.

Backfill for foundation walls and retaining walls may consist of low plastic silty clay or 1-inch minus crushed limestone. We advise performing field density tests on at least every other lift to monitor compaction. As an alternate, we suggest using 1-inch clean crushed limestone to provide improved drainage and to reduce lateral pressures on the walls. Due to a slight risk of migration of soil fines into the clean rock, a synthetic filter fabric, such as Mirafi 140N or equivalent, should be placed between the soil face of the excavation and the crushed limestone. If clean rock is used, it may be placed in 2-foot-thick lifts and tamped or tracked to achieve adequate densification. Exterior clean rock backfill should be capped with cohesive soil to reduce the potential for surface water infiltration.

Backfill placed next to walls should be compacted with hand operated equipment and not large self-propelled or machine operated equipment, which could result in potential overcompaction and higher lateral pressures. Compaction should be reduced within approximately 1 foot of the walls, and the walls

should be observed periodically for signs of movement. If movement is detected, it may be necessary to provide bracing and/or change backfill procedures.

In addition to the minimum density requirements listed above, the soil must be stable, i.e., not "pumping" or rutting excessively under construction traffic, prior to placing additional fill or constructing foundations, or floor slabs. Field density tests should be performed on each lift of fill to document that proper compaction is achieved.

5.3 Shallow Foundation Excavations

SCI should observe all footing and floor slab excavations for problem areas, such as soft zones or areas of untreated fat clay, prior to placing concrete. Excessive disturbance of siltier soils in footing excavations should be avoided and could complicate construction. The potential for such disturbance will increase during wetter times of the year. Footing excavations that have been excessively disturbed should be overdeepened to approved undisturbed soils. Overexcavation and replacement with structural fill should be performed where inadequate bearing materials are present in footing excavations.

The base of all excavations should be clean, free of loose soil or uncompacted fill, relatively dry and maintained near their optimum moisture content. Excavations should be protected from extreme temperatures, precipitation, and construction disturbances. To reduce the possibility of desiccation or saturation of the foundation soils, we recommend that the concrete be placed as soon as possible after excavations are made.

Groundwater is not anticipated to be encountered in the footing excavations. However, in most situations, small amounts of groundwater seepage into the excavations can be handled by means of gravity ditching and a sump pump. If greater flows are experienced, SCI should be retained to provide additional consultation.

5.4 Subgrade Considerations

Floor slab subgrades may be subjected to construction traffic and exposure to weather for an extended period and significant problems may be incurred. It may be necessary to proofroll the subgrade, in both cut and fill areas, and recompact the subgrade immediately prior to placing base rock for the floor slab or pavement. In addition, subgrades covered with base rock may be very slow to dry if precipitation occurs after placing the base rock. Therefore, we recommend that proofrolling and placement of the base rock

be done as close to the time of pouring the floor slab or paving as is practical. Proofroll passes should be limited, particularly on silty subgrades, to reduce the potential for pumping of moisture from deeper within the soil profile.

Special measures may be required to facilitate construction during wet or cold weather, or where excessive areas of soft soils are identified. These measures may include, but are not limited to, the addition of lime to the subgrade soils for drying purposes, or the removal of soft spongy soils and their replacement with crushed limestone. Soft areas should be selectively undercut and backfilled with properly compacted cohesive soil. A geotextile, such as Mirafi 600X, or geogrid, such as Tensar TriAx-140, or equivalents, may be used to help stabilize particularly soft areas. Where possible, the subgrade should be sloped to provide drainage.

5.5 Excavation Bracing Requirements

In the *Federal Register*, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, Part 1926, Subpart P." This document was issued to provide for the safety of workers entering excavations, including utility trenches, basements, footings, and others. All operations should be performed under the supervision of qualified site personnel in accordance with OSHA regulations.

5.6 Erosion Control and Land Disturbance Monitoring Program

Appropriate erosion and sediment control measures, such as proper contouring during site grading activities, the installation of siltation fences, and/or inlet protection, should be used during construction to keep eroded materials from being carried onto adjacent properties or waterbodies. Depending on the length of time the subgrade is exposed and the amount of siltation that occurs, it may be necessary to periodically remove materials collected by the sediment control systems. Timely sodding and/or seeding of sloped surfaces will help reduce this potential problem.

SCI recommends following the procedures detailed in the Stormwater Pollution Prevention Plan (SWPPP). Any site disturbing more than one acre of ground must obtain a Land Disturbance Permit from the Missouri Department of Natural Resources (MDNR). As part of the permit compliance procedures, weekly and rain-event site observations must be performed to document the changing site conditions and maintenance of control measures.

6.0 CONSTRUCTION MONITORING PROGRAM

The following list summarizes SCI's recommendations for a construction monitoring program. These services are recommended to provide quality assurance in assessing design assumptions and to document earth-related construction procedures for compliance with plans, specifications, and good engineering practice. SCI should be retained to:

- Participate in a formal preconstruction meeting with the Owner's Representative, Civil Engineer, and Contractor, prior to construction at the site.
- Observe site preparation activities prior to construction, including stripping and proofrolling.
- Conduct and document weekly and rain-event observations at the site, maintain and update on-site paperwork, and provide submittals required by the SWPPP and Land Disturbance Permit.
- Assess the suitability of potential fill materials, including both on-site and off-site sources.
- Monitor placement and compaction of structural fill and backfill.
- Observe foundation excavations and the floor slab subgrade to assess the impact of the existing fills and potentially expansive soils, and to recommend the extent of remedial measures.
- Observe footing excavations for adequacy of bearing materials.
- Observe the floor slab subgrade prior to placing base rock.
- Observe backfilling of below-grade utility excavations.
- Observe pavement subgrade preparation and provide observation and testing services for the base course and pavement section.
- Check the thickness of pavement sections and, for asphaltic concrete, its density.
- Provide quality assurance testing of structural concrete and pavement materials.

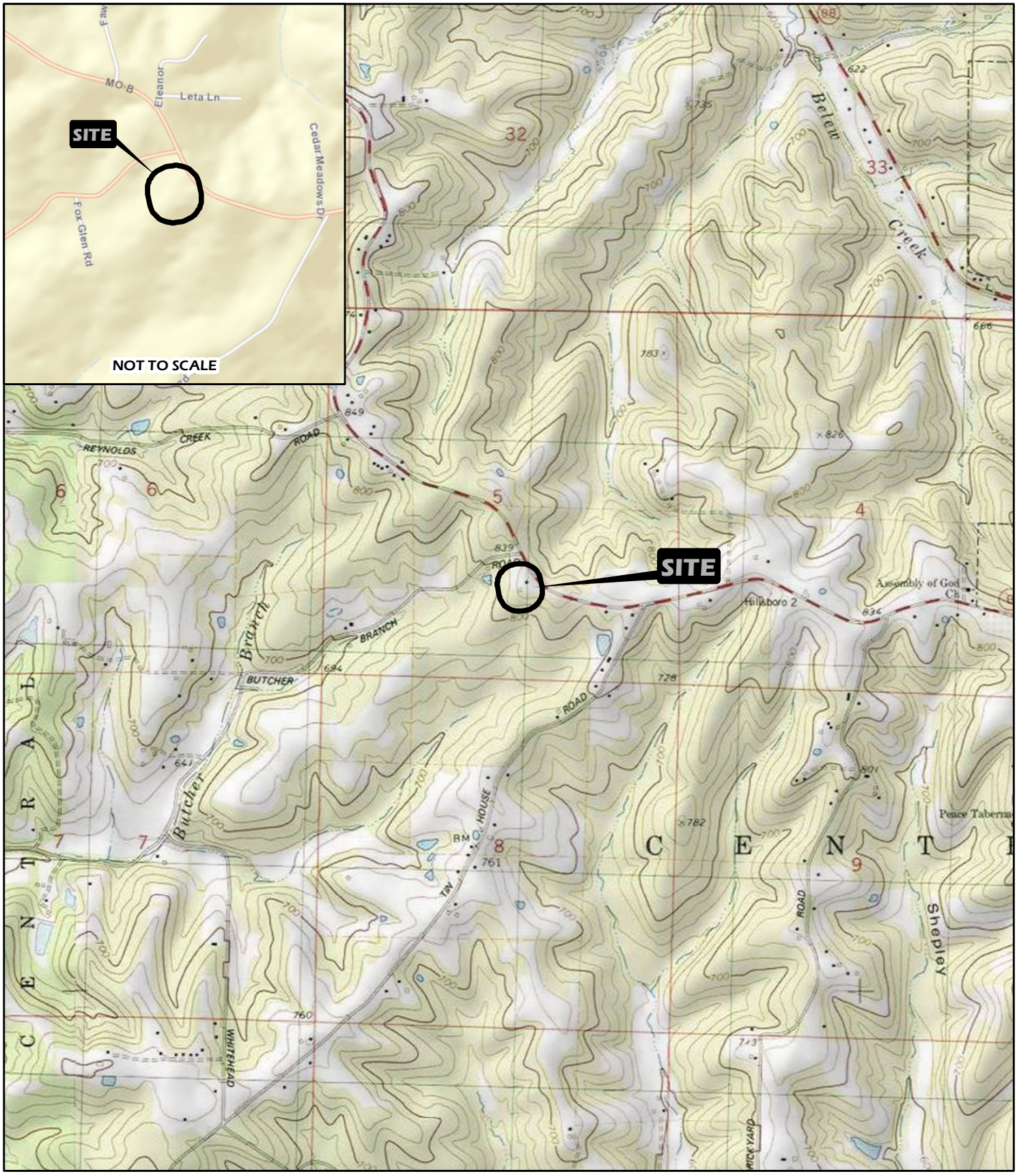
7.0 LIMITATIONS

The recommendations provided herein are for the exclusive use of our client. It is imperative that SCI be contacted by any third-party interests to evaluate the applicability of this report relative to use by anyone other than our client. Our recommendations are specific only to the project described, and are not meant to supercede more stringent requirements of local ordinances. They are based on subsurface information obtained at three specific widely-spaced, boring locations within the project area; our understanding of

the project as presented in Section 2.0, "Site and Project Description"; and geotechnical engineering practice consistent with the standard of care. No other warranty is expressed or implied. SCI should be contacted if conditions encountered are not consistent with those described.

We should also be provided with a set of final development plans, once they are available, to review whether our recommendations have been understood and applied correctly, and to assess the need for additional exploration or analysis. Failure to provide these documents to SCI may nullify some or all of the recommendations provided herein. In addition, any changes in the planned project or changed site conditions may require revised or additional recommendations on our part.

The final part of our geotechnical service should consist of direct observation during construction, to observe that conditions actually encountered are consistent with those described in this report, and to assess the appropriateness of the analyses and recommendations contained herein. SCI cannot assume responsibility or liability for the adequacy of its recommendations without being retained to observe construction.



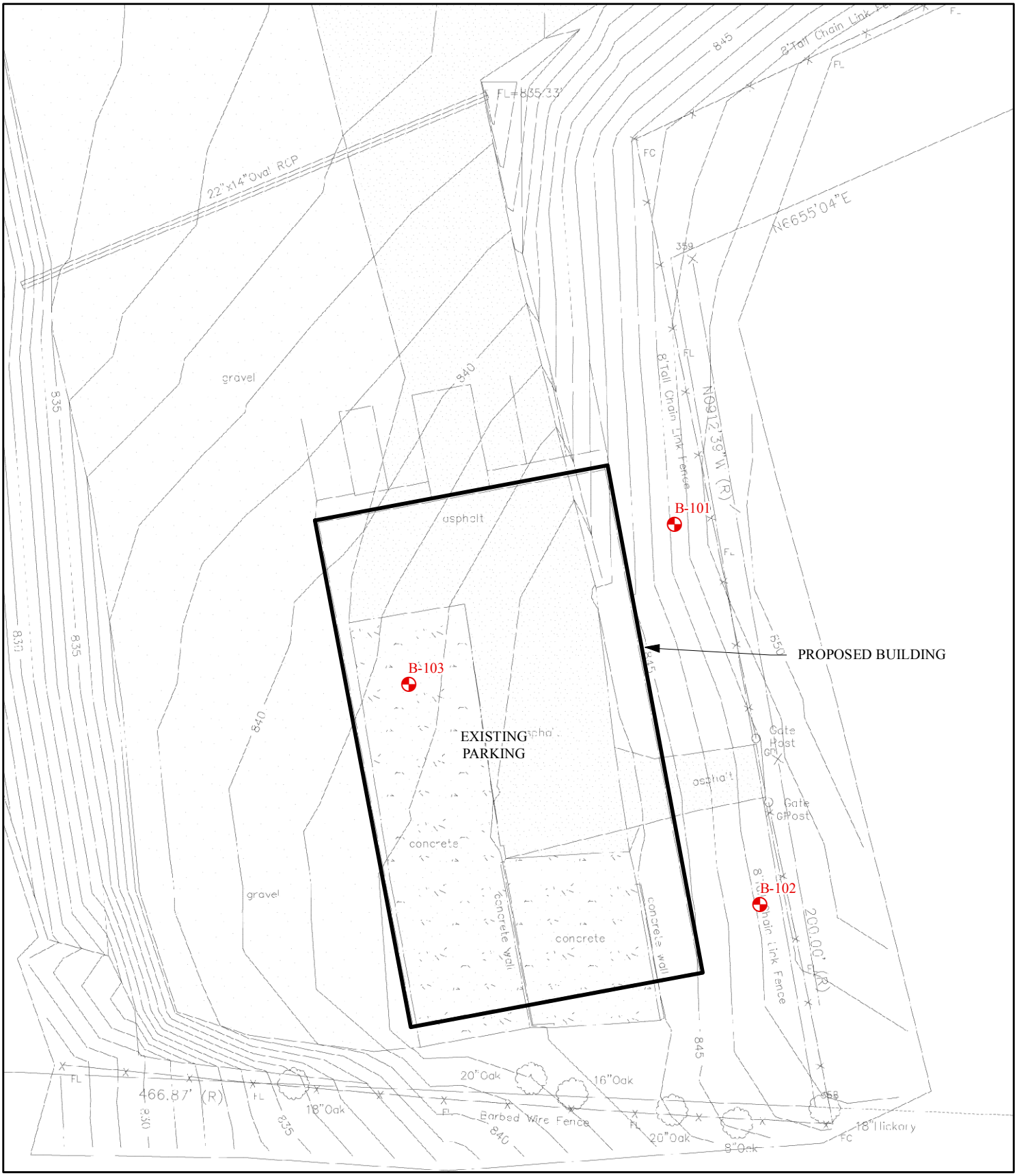
PROJECT NAME				**GENERAL NOTES/LEGEND**
LIGHT FLEET VEHICLE MAINTENANCE BUILDING HILLSBORO, MISSOURI				USGS TOPOGRAPHIC MAP DESOTO, MISSOURI QUADRANGLE DATED 1981 20' CONTOURS
VICINITY AND TOPOGRAPHIC MAP				
DRAWN BY	RCV	**DATE**	**JOB NUMBER**	**SCALE** 1" = 2000'
CHECKED BY	HHF	06/2014	2014-5001.10	**FIGURE** 1

PROJECT NAME: LIGHT FLEET VEHICLE MAINTENANCE BUILDING HILLSBORO, MISSOURI				GENERAL NOTES/LEGEND: INDICATES APPROXIMATE SOIL BORING LOCATIONS.
AERIAL PHOTOGRAPH				
DRAWN BY: RCV	DATE: 06/2014	JOB NUMBER: 2014-5001.10		AERIAL PHOTOGRAPH OBTAINED FROM ARCGIS ONLINE - WORLD IMAGERY, DATED 12/2012.
CHECKED BY: HHF				

N W E S

SCALE 1" = 30'

FIGURE 2



PROJECT NAME: LIGHT FLEET VEHICLE MAINTENANCE BUILDING HILLSBORO, MISSOURI				GENERAL NOTES/LEGEND
SITE PLAN				INDICATES APPROXIMATE SOIL BORING LOCATIONS.
DRAWN BY	RCV	DATE	JOB NUMBER	UNDATED PLAN PROVIDED ELECTRONICALLY ON 6/13/2014 BY BACON COMMERCIAL DESIGN. DIMENSIONS AND LOCATIONS ARE APPROXIMATE; ACTUAL MAY VARY. DRAWING SHALL NOT BE USED OUTSIDE THE CONTEXT OF THE REPORT FOR WHICH IT WAS GENERATED.
CHECKED BY	HHF	06/2014	2014-5001.10	

N W E S

SCALE 1" = 30'

FIGURE 3

Appendix A

SCI ENGINEERING, INC.
47 St. Andrews Drive
Union, Missouri 63084
636-584-7991 Fax 636-584-7966
www.sciengineering.com

BORING LOG LEGEND AND NOMENCLATURE

Depth is in feet below ground surface. **Elevation** is in feet mean sea level, site datum, or as otherwise noted.

Sample Type

- **SS** Split-spoon sample, disturbed, obtained by driving a 2-inch-O.D. split-spoon sampler (ASTM D 1586).
- **NX** Diamond core bit, nominal 2-inch-diameter rock sample (ASTM D 2113).
- **ST** Thin-walled (Shelby) tube sample, relatively undisturbed, obtained by pushing a 3-inch-diameter, tube (ASTM D 1587).
- **CS** Continuous sample tube system, relatively undisturbed, obtained by split-barrel sampler in conjunction with auger advancement.
- **SV** Shear vane, field test to determine strength of cohesive soil by pushing or driving a 2-inch-diameter vane, and then shearing by torquing soil in existing and remolded states (ASTM D 2573).
- **BS** Bag sample, disturbed, obtained from cuttings.

Recovery is expressed as a ratio of the length recovered to the total length pushed, driven, cored.

Blows Numbers indicate blows per 6 inches of split-spoon sampler penetration when driven with a 140-pound hammer falling freely 30 inches. The number of total blows obtained for the second and third 6-inch increments is the N value (Standard Penetration Test or SPT) in blows per foot (ASTM D 1586). Practical refusal is considered to be 50 or more blows without achieving 6 inches of penetration, and is expressed as a ratio of 50 to actual penetration, e.g., 50/2 (50 blows for 2 inches).

For analysis, the N value is used when obtained by a cathead and rope system. When obtained by an automatic hammer, the N value may be increased by a factor of 1.3.

Vane Shear Strength is expressed as the peak strength (existing state) / the residual strength (remolded state).

Description indicates soil constituents and other classification characteristics (ASTM D 2488) and the Unified Soil Classification (ASTM D 2487). Secondary soil constituents (expressed as a percentage) are described as follows:

Trace	<5
Few	5-15
With	>15-30

Stratigraphic Breaks may be observed or interpreted, and are indicated by a dashed line. Transition between described materials may be gradual.

Laboratory Test Results

- Natural moisture content (ASTM D 2216) in percent.
- Dry density in pounds per cubic foot (pcf).
- Hand penetrometer value of apparently intact cohesive sample in kips per square foot (ksf).
- Unconfined compressive strength (ASTM D 2166) in kips per square foot (ksf).
- Liquid and Plastic Limits (ASTM D 4318) in percent.

RQD (Rock Quality Designation) is the ratio between the total length of core segments 4 inches or more in length and the total length of core drilled. RQD (expressed as a percentage) indicates insitu rock quality as follows:

Excellent	90 to 100
Good	75 to 90
Fair	50 to 75
Poor	25 to 50
Very Poor	0 to 25

BORING LOG

PROJECT Light Fleet Vehicle Maintenance Building | **BORING NUMBER** B-101
LOCATION Hillsboro, Missouri | **SHEET** 1 **of** 1
DRILLER Midwest Drilling, Inc. | **HAMMER** Automatic | **PROJECT NO.** 2014-5001.10
EQUIPMENT CME-750 w/CFA | **ELEVATION** 845.9 | **DATE DRILLED** 05/28/14

DEPTH (ft)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE RECOVERY (in/in)	SAMPLE BLOWS (per 6 in)	DESCRIPTION (UNIFIED SOIL CLASSIFICATION)	GRAPHIC	SEE REMARK NO.	LAB: MOISTURE CONTENT (%)	LAB: DRY DENSITY (pcf)	LAB: HAND PENETROMETER (ksf)	LAB: UNCONFINED COMPRESSIVE STRENGTH (ksf)	LAB: LIQUID LIMIT	LAB: PLASTICITY INDEX	ELEVATION (ft)
					FAT CLAY (CH): Red, with weathered sandstone gravel									
	1	SS	12/18	4 6 7				20		3.5				845
					Trace chert gravel									
5	2	SS	13/18	5 7 8				52		1.5		96	58	
					Weathered sandstone									840
	3	SS	1/1	50/1"	Auger refusal on sandstone at 6.3 feet			13		--				
10														835
15														830
20														825

WATER LEVEL:

X	NONE OBSERVED WHILE DRILLING
	ft WHILE DRILLING
	ft ___ HRS AFTER DRILLING
	ft ___ DAYS AFTER DRILLING

REMARKS:

BORING LOG

PROJECT Light Fleet Vehicle Maintenance Building | **BORING NUMBER** B-102
LOCATION Hillsboro, Missouri | **SHEET** 1 **of** 1
DRILLER Midwest Drilling, Inc. | **HAMMER** Automatic | **PROJECT NO.** 2014-5001.10
EQUIPMENT CME-750 w/CFA | **ELEVATION** 846.6 | **DATE DRILLED** 05/28/14

DEPTH (ft)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE RECOVERY (in/in)	SAMPLE BLOWS (per 6 in)	DESCRIPTION (UNIFIED SOIL CLASSIFICATION)	GRAPHIC	SEE REMARK NO.	LAB: MOISTURE CONTENT (%)	LAB: DRY DENSITY (pcf)	LAB: HAND PENETROMETER (ksf)	LAB: UNCONFINED COMPRESSIVE STRENGTH (ksf)	LAB: LIQUID LIMIT	LAB: PLASTICITY INDEX	ELEVATION (ft)
	1	SS	11/18	6 8 9	FILL: Red fat clay and brown lean clay, trace fine to coarse sand, with gravel			15		4.0				845
	2	SS	14/18	9 10 9	GRAVELLY FAT CLAY (CH): Red, gravel is chert and sandstone			33		4.0		117	77	
5	3	SS	13/18	5 18 19	With weathered sandstone, trace chert gravel			45		5.0				840
					Auger refusal on sandstone at 8 feet									
10														835
15														830
20														825

WATER LEVEL:

X	NONE OBSERVED WHILE DRILLING
	ft WHILE DRILLING
	ft ___ HRS AFTER DRILLING
	ft ___ DAYS AFTER DRILLING

REMARKS:

BORING LOG

PROJECT Light Fleet Vehicle Maintenance Building | **BORING NUMBER** B-103
LOCATION Hillsboro, Missouri | **SHEET** 1 **of** 1
DRILLER Midwest Drilling, Inc. | **HAMMER** Automatic | **PROJECT NO.** 2014-5001.10
EQUIPMENT CME-750 w/CFA | **ELEVATION** 841.3 | **DATE DRILLED** 05/28/14

DEPTH (ft)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE RECOVERY (in/in)	SAMPLE BLOWS (per 6 in)	DESCRIPTION (UNIFIED SOIL CLASSIFICATION)	GRAPHIC	SEE REMARK NO.	LAB: MOISTURE CONTENT (%)	LAB: DRY DENSITY (pcf)	LAB: HAND PENETROMETER (ksf)	LAB: UNCONFINED COMPRESSIVE STRENGTH (ksf)	LAB: LIQUID LIMIT	LAB: PLASTICITY INDEX	ELEVATION (ft)
					CONCRETE - 5.5 inches									
					CRUSHED ROCK - 3 inches									
	1	SS	9/18	3 3 3	FILL: Gray limestone gravel with brown lean clay			24		3.5				840
					FILL: Red fat clay and brown lean clay, with sandstone gravel									
5	2	SS	15/18	7 7 7				17		2.5		63	42	
					FAT CLAY (CH): Brownish-red, trace fine sand									835
	3	SS	18/18	3 4 5				55		5.0				
					Becomes yellowish-brown, with sandstone gravel									
	4	SS	13/15	4 6 50/3"				54		2.5				
10					Weathered Sandstone									
					Auger refusal on sandstone at 10.8 feet									830
15														825
20														820

WATER LEVEL:

X	NONE OBSERVED WHILE DRILLING
____ ft	WHILE DRILLING
____ ft	____ HRS AFTER DRILLING
____ ft	____ DAYS AFTER DRILLING

REMARKS:

Important Information about Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

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