Terry McKee, IS & Procurement Director
901 Broadway, N.E. • Knoxville, TN 37917-6699
865.403.1133 • Fax 865.594.8858
purchasinginfo@kcdc.org
www.kcdc.org

Invitation for Sealed Bids

"New Senior and Handicapped Housing Facility for Five Points Phase 1 at the corner of Bethel Avenue & McConnell Street in Knoxville Tennessee"

Bid Number: C16002

Due Date: 2:00 p.m. (Eastern Standard Time) on December 3, 2015

Check KCDC's web page for addenda and changes before submitting your bid.

Pre-Bid Meeting: November 12, 2015 at 8:30 a.m. in the Board Room at KCDC office at 901 Broadway in Knoxville.

Please read this document before the meeting and be prepared to ask your questions about it.

Deliver Bids to: Knoxville's Community Development Corporation
Purchasing Division (building behind the main office building)
901 Broadway N.E.
Knoxville, Tennessee 37917

Faxed/Emailed Bids are acceptable: Yes ☐ No ☒

Award Results: KCDC posts both a summary of the bids received and the award decision to its web page at:

http://www.kcdc.org/en/DoingBusiness/SolicitationResults.aspx

Electronic Copies: If you want MS Word copy of this document, send an email requesting it to purchasinginfo@kcdc.org.

General Information for Vendors

1. **BACKGROUND AND INTENT**

a. Knoxville's Community Development Corporation (KCDC) is the public housing and redevelopment agency for the City of Knoxville and for the County of Knox in Tennessee. KCDC's public housing property portfolio includes seventeen housing properties with approximately 3,551 dwelling units. KCDC also administers approximately 3,700 vouchers through our Section 8 department and has three tax credit properties.

b. This construction project is for a new 90 unit apartment building for seniors and handicapped persons for KCDC. Construction will be a 3 story wood type construction building with approximately 72,000 square feet of conditioned space.

2. **BONDS**

Bid, payment and performance bonds are required **if** the bid exceeds $100,000 in value. Bonding requirements include:

a. A bid guarantee from each vendor equivalent to five percent (5%) of the bid price. Such bid bond must accompany the bid. Bid bonds will not be returned until a contract is signed.

b. One of the following is required (upon award):

1. A performance and payment bond for 100% of the contract price; or

2. 25% cash escrow; or

3. 25% irrevocable letter of credit.

c. All bonding companies must be listed in the Federal Register, Department of the Treasury Fiscal Service, Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies; Notice. Companies licensed to do business in the State of Tennessee must issue all required bonds.

3. **CHANGES AFTER AWARD**

It is possible that after award KCDC will need to revise the service needs or requirements specified in this document. KCDC reserves the right to make such changes after consultation with the vendor. Should additional costs arise, KCDC reserves the right to accept these charges provided the vendor can document the increased costs. KCDC reserves the right to add or delete sites (properties) as needs change.

4. **CODES AND ORDINANCES**

All work covered by these contract documents is to be done in full accord with national, state and local codes, ordinances and orders that are in effect at the time the work is performed. The

successful vendor and any sub-vendors must meet and fulfill all requirements of the local building department and fire jurisdiction.

5. **CONTACT POLICY**

The vendor may not contact anyone other than the KCDC's Purchasing Division from the issuance of this solicitation until award about matters pertaining to this solicitation. Information obtained from an unauthorized officer, agent, or employee of KCDC will not affect the risks or obligations assumed by the vendor or relieve the vendor from fulfilling any of the conditions of the resulting award for the purpose of this project. Additionally, such contact can disqualify the vendor from participation in the solicitation process.

6. **CONTRACT DOCUMENTS**

KCDC has posted a prototype of the contract and rider that will be used for this work to its webpage. Please review these documents before you submit a bid.

7. **DAMAGE**

The awarded vendor is responsible for all damage to buildings, equipment, grounds, premises and all other types of potential damage resulting service provision as requested herein.

8. **EMPLOYEES**

Vendor will:

a. Only allow personnel thoroughly trained and skilled in the tasks assigned them to work on the KCDC job.

b. Have sufficient personnel to complete the work in a timely manner.

c. Enforce strict discipline and good order among his/her employees. Employees may not loiter on the premises before or after job working hours.

d. Provide at least one employee on every job assignment with the ability to clearly speak, read, write and understand the English language in order for KCDC's representatives to effectively communicate with the vendor.

9. **ENTRANCE TO KCDC SITES**

Vendor employees are not to be on KCDC premises unless they are working on a KCDC project. Acquaintances, family members, assistants or any person not working on KCDC's behalf, will not accompany employees on KCDC sites unless said person is an authorized employee of the vendor.

10. **EQUIPMENT:**

Vendor shall provide all necessary equipment, materials, supplies, et cetera needed for the performance of the work.

11. **EVALUTION:**

KCDC will primarily evaluate the responses to this solicitation on the factors shown below. However, KCDC will arrive at the "lowest and best" solution for the final award. This may or may not entail simply awarding to the vendor quoting the lowest cost.

FACTORS	MAXIMUM POINTS
Cost	100
Total	100

All responses are subject to a determination of "responsive" and "responsible" prior to award. KCDC is the sole judge as to "responsiveness" and "responsibility" of vendors.

KCDC reserves the right to request additional information from vendors to assist in the evaluation process. This includes references and business capacity information.

12. **GENERAL INSTRUCTIONS**

KCDC no longer inserts "General Instructions to Vendors" in the solicitation document. Instead, these instructions are at www.kcdc.org. Click on "Doing Business With KCDC" where you will find a link to the instructions. By submitting a response to this solicitation, the vendor accepts the responsibility for downloading, reading and abiding by the terms and conditions set forth in KCDC's "General Instructions to Vendors." Vendors may wish to review certain applicable HUD instructions on KCDC's webpage.

13. **IDENTIFICATION**

The vendor's employees **will** have proper identification displayed, at all times, while on KCDC property. All employees **must** wear a company uniform or have picture identification badges or other company identification at all times. Vendor vehicles are to have placards (on the doors or in the windshield) that identify the company name.

14. **INSURANCE**

The contractor shall maintain, at contractor's sole expense, on a primary and non-contributory basis, at all times during the life of the contract insurance coverages, limits, and endorsements described herein. All insurance must be underwritten by insurers with an A.M. Best rating of A VII or better. Upon award, the contractor shall provide Certificate(s) of Insurance to KCDC evidencing said insurance coverages.

The contractor agrees the insurance requirements herein as well as KCDC's review or acknowledgement, is not intended to and shall not in any manner limit or qualify the liabilities and obligations assumed by the contractor under this contract

a. ***Commercial General Liability Insurance:*** with a minimum combined single limit of $1,000,000 per occurrence per project with $2,000,000 in the aggregate with the minimum of $5,000,000 per occurrence umbrella covering the following perils: products/completed operations ($2,000,000) for one year after completion of the project; broad form property damage including completed operations for one year after completion of the project.

Such insurance shall contain or be endorsed to contain a provision that includes KCDC, its officials, officers, employees, and volunteers as additional insureds with respect to liability arising out of work or operations performed by or on behalf of the contractor including materials, parts, or

equipment furnished in connection with such work or operations. The coverage shall contain no special limitations on the scope of its protection afforded to the above-listed insureds.

In addition, Five Points 1 LP (Owner); Five Points 1 Corporation (General Partner); RSEP Holding, LLC (Limited Partner); Red Stone Equity Manager, LLC (Special Limited Partner); and Red Stone – 2015 National Fund LP (Limited Partner) shall be named as additional insureds. Certificates of Insurance must read verbatim as noted at the end of this section.

If necessary, umbrella/excess liability insurance can be used in conjunction with the general liability insurance to meet these requirements. Unless the umbrella/excess liability insurance provides coverage on a pure/true follow-form basis, or the above listed additional insureds are automatically defined as an additional insured, the contractor shall add by endorsement, each of the entities listed above as additional insureds.

b. ***Automobile Liability Insurance:*** including vehicles owned, hired, and non-owned, with a combined single limit of not less than $1,000,000 each occurrence. Such insurance shall include coverage for loading and unloading hazards.

c. ***Workers' Compensation Insurance and Employers Liability Insurance:*** with statutory limits as required by the State of Tennessee or other applicable laws.

d. ***Builder's Risk:*** coverage shall be written on an All-Risk, Replacement Cost, and Completed Value Form basis in an amount at least equal to one-hundred percent (100%) of the projected completed value of the Work, as well as subsequent modifications of that sum due to Change Order(s). Contractor agrees to be responsible for reporting increases in the projected completed value of the work due to Change Order(s).

Coverage shall insure against the perils of fire and extended coverage and physical loss or damage including, but not limited to, theft, vandalism, malicious mischief, collapse, windstorm, testing and startup, temporary buildings portions of the work stored off site, all portions of the work in transit, debris removal including demolition occasioned by enforcement of any applicable legal requirements and shall cover reasonable compensation for architect's and contractor's services and expenses required as a result of such insured loss. Insurance is to cover all property of contractor (and its subcontractors) and KCDC at the construction site. Coverage shall cover the completed value of the construction including without limitation, slab on grade, excavations, foundations, caissons, tenant finish work, and retaining walls around the perimeter of the project. Any exclusion of so-called underground damage to pipes, collapse of structure, or damage resulting from explosion or blasting shall be deleted. Such policy shall provide that any loss thereunder shall be payable to the contractor, KCDC, and others as their interests may appear and shall also have a replacement cost endorsement. See list of additional insured and certificate holders below.

e. ***Pollution Liability Insurance*****:** pollution liability coverage, providing defense and indemnity coverage for bodily injury, property damage, and environmental investigation and clean-up costs for pollution conditions arising from the contractor's operations. Limit of liability not less than $1,000,000 each occurrence and $2,000,000 annual aggregate. The policy shall include a minimum three (3) year Discovery (tail) reporting period, and a Retroactive Date that equals or precedes the

effective date of this contract or the performance of work hereunder. Coverage may be provided on a per project basis.

f. ***Other Insurance Requirements:*** Contractor shall:

1. Upon award, furnish KCDC with original Certificates of Insurance and amendatory endorsements effecting coverage required by this section. Certificates of Insurance shall provide a minimum 30-day endeavor to notify KCDC, of cancellation when available by contractor's insurance. If the contractor receives a non-renewal or cancellation notice from an insurance carrier affording the required coverage, or receives notice that coverage no longer complies with the insurance requirements herein, contractor shall notify KCDC, and Owner by email or fax within five (5) business days and provide a copy of the non-renewal for cancellation notice or written specifics as to which coverage is no longer in compliance.

2. Provide certified copies of endorsements and policies if requested by KCDC in lieu of or in addition to Certificates of Insurance.

3. Replace certificates, policies, and endorsements for any such insurance expiring prior to completion of services.

4. Maintain such insurance from the time services commence until services are completed. Failure to maintain or renew coverage or to provide evidence of renewal may be treated by KCDC as a material breach of contract.

5. Require all subcontractors to maintain during the term of the resulting contract commercial general liability insurance, automobile liability insurance, and workers' compensation/employers liability insurance (unless subcontractor's employees are covered by contractor's insurance) in the same manor and limits as specified for the contractor with the exception of the following limits:

   General Liability – limits of not less than $1,000,000 each occurrence. If such insurance contains a general aggregate, it shall apply separately to the work/location for this contract or be no less than $2,000,000.

   Contractor shall furnish subcontractor(s)' Certificates of Insurance to KCDC without expense prior to subcontractor(s) commencing work.

6. Any deductibles and/or self-insured retentions greater than $50,000 must be disclosed to and approved by KCDC prior to the commencement of services. Use of large deductibles and/or self-insured retentions will require proof of financial ability as determined by KCDC.

7. Provide a waiver of subrogation for each required policy herein. When required by the insurer, or should a policy condition not permit contractor to enter into a pre-loss agreement to waive subrogation without an endorsement, the policy should be endorsed with a Waiver of Transfer of Rights of Recovery Against Others, or its equivalent. This waiver of subrogation requirement shall not apply to any policy which includes a condition specifically prohibiting such an endorsement, or voids coverage should contractor enter into such an agreement on a pre-loss basis.

8. All policies must be written on an occurrence basis.

g. **Right to Revise or Reject:** KCDC reserves the right, but not the obligation, to review or revise any insurance requirement, not limited to limits, coverages and endorsements based on insurance market conditions affecting the availability or affordability of coverage; or changes in the scope of work / specifications affecting the applicability of coverage.

h. **No Representation of Coverage Adequacy:** The coverages, limits or endorsements required herein protect the primary interests of KCDC, and the contractor agrees in no way should these coverages, limits or endorsements required be relied upon when assessing the extent or determining appropriate types and limits of coverage to protect the contractor against any loss exposures, whether as a result of the project or otherwise.

i. Certificate Holders and Additional Insureds:
Knoxville's Community Development Corporation (KCDC), its officials, officers, employees, and volunteers
901 Broadway, NE
Knoxville, TN 37917

Five Points 1 LP
901 Broadway, NE
Knoxville, TN 37917

Five Points 1 Corporation
901 Broadway, NE
Knoxville, TN 37917

RSEP Holding, LLC, its successors and/or assigns,
200 Public Square, Suite 2050
Cleveland, OH 44114

Red Stone Equity Manager, LLC, its successors and/or assigns
200 Public Square, Suite 2050
Cleveland, OH 44114

Red Stone 2015 National Fund, LP, its successors and/or assigns
200 Public Square, Suite 2050
Cleveland, OH 44114

15. **LICENSING**

a. Vendors must be properly licensed by the State of Tennessee and all other authorities having jurisdiction. Throughout the term of this award, the vendor shall maintain the required licenses.

b. In addition to any City or County licenses that may be required, all vendors must be licensed vendors as required by the "Vendor's Licensing Act of 1994" as mandated by the State of Tennessee. The vendor must have the necessary licensing classifications as required by the Rules

of the Tennessee Board for Licensing General Vendors. For your convenience, an envelope coversheet is at the end of this document. Use it to supply the required information.

c. The State of Tennessee Contractor Licensing Board has told KCDC that one of the following licenses is required for this work because the cost will exceed $25,000. However, KCDC will abide by any opinions or rulings that the State Vendor Licensing Board issues irrespective of this initial ruling. Any subsequent ruling by the State Licensing Board automatically revises these specifications- irrespective of the timing of the notice from the State and irrespective of the status of this solicitation.

- BC
- BC-B

In addition, licensed subcontractors would be required to have the following classifications for portions in excess of $25,000:

- CE - Electrical
- CMC or CMC-A - Plumbing
- CMC or CMC-C - HVAC

In addition, licensed subcontractors would be required to have the following classifications for portions in excess of $100,000:

- BC-9 - Masonry

16. **LIQUIDATED DAMAGES**
Liquidated damages shall apply at $500.00 per calendar day for each day beyond the scheduled completion date and such provision shall be included in the contract for construction. However, KCDC will consider explanatory information if it provides a valid reason for delays in schedule.

17. **MATERIALS AND WORKMANSHIP**
All materials and equipment furnished shall be new and best quality. Work shall be accurate, professionally finished and subject to KCDC's approval. All materials and equipment provided shall conform to regulations of enforcement bodies having jurisdiction. Vendor shall furnish material samples for approval if specified and so desired by KCDC.

18. **MEASUREMENTS AND DRAWINGS**
Drawings or measurements included with contract documents are for the convenience of the vendor. Complete responsibility for detailed dimensions lies with the vendor. The vendor shall verify all dimensions with the actual on site conditions.

19. **PERMITS**
The vendor shall obtain and pay for or cause its subcontractors to obtain and pay for all permits required to complete required work. In addition, vendor shall arrange, schedule, and pay for or cause its subcontractors to arrange, schedule and pay for all required final inspections by state,

local, or independent certified inspecting authorities necessary for issuance of all required KCDC utilization permits in regard to completed work.

The successful vendor will pay for taps and other fees associated with the permits.

20. **QUESTIONS**

Submit questions via email with "Question about the Construction of New Senior and Handicapped Housing Facility" in the subject line, at least five days prior to the due date to purchasinginfo@KCDC.org**.**

21. **REPRESENTATIONS**

By submitting a response, the vendor represents and warrants:

a. That the vendor is financially solvent and that it is experienced in and competent to perform the type of work, and/or to furnish the personnel, plans, materials, supplies or equipment to be performed or furnished by it; and

b. That the vendor is familiar with all federal, state, municipal and county laws, ordinances and regulations, which may in any way affect the work of those employed therein, including but not limited to any special acts relating to the work or to the project of which it is a part; and

c. That the vendor has carefully examined the plans, the specifications and the worksites and that from its own investigations, has satisfied itself as to the nature and location of the work, the character, quality, quantity of surface and subsurface materials likely to be encountered, and character of equipment and other facilities needed for the performance of the work, the general and local conditions and all other materials which may in any way affect the work or its performance.

22. **RESPONSIBILITIES**

At no expense to KCDC, the vendor will:

a. Provide quality control for all services provided.

b. Provide competent supervision.

c. Provide competent workers.

d. Take precautions necessary to protect persons or property against injury or damage and be responsible for any such damage, or injury that occurs because of their fault or negligence.

e. Perform work without unnecessarily interfering with the activities of KCDC, residents or other vendors.

23. **SAFETY**

a. The vendor shall be responsible for providing and for the placement of barricades, tarps, plastic, flag tape and other safety/traffic control equipment required to protect the public, surrounding areas, equipment and vehicles.

b. The vendor shall ensure that the flow of vehicular traffic be impeded as little as possible during the project. The safety of the public is of prime concern to KCDC and all costs associated are the responsibility of the vendor.

c. The vendor shall ensure that its employees exercise all necessary caution and discretion to avoid injury to persons or damage to property.

d. All buildings, appurtenances and furnishings shall be protected by the vendor from damage, which might be done or caused by work performed under this contract. Such damages to the foregoing shall be repaired and/or replaced by approved methods to restore the damaged areas to their original condition at the sole expense of the vendor.

e. Vendor shall use caution signs as required by OSHA Regulation 1910.144 and 1910.145 at no cost to KCDC. Caution signs shall be on-site on commencement of contract.

f. Vendor shall comply with all other OSHA and TOSHA safety standards that apply.

24. **SECTION 3 OF THE HUD ACT OF 1968**

Section 3 is a provision of the Housing and Urban Development Act of 1968, which requires that programs of direct financial assistance administered by the U.S. Department of Housing and Urban Development (HUD) provide, to the greatest extent feasible, opportunities for job training and employment to lower income residents in connection with projects in their neighborhoods. Further, to the greatest extent feasible, contracts in connection with these projects are to be awarded to local businesses. Section 3 is a tool for fostering local economic development, neighborhood economic improvement and individual self-sufficiency.

a. Recipients and vendors must make a good faith effort to utilize Section 3 area residents as trainees and employees in connection with the project. Targeted recruitment and the selection of Section 3 area residents for available positions are two examples of good faith efforts to meet this requirement.

b. Recipients and vendors must make a good faith effort to award contracts to Section 3 business concerns for work in connection with the project. An example of a good faith effort to meet this requirement is the implementation of an affirmative action plan, which includes targets for the number and dollar value for awarding contracts to Section 3 business concerns.

c. Recipients and vendors must keep records and submit reports to HUD documenting the good faith efforts taken and the results of these actions. Examples of such documentation include letters to community organizations, employment development and business development centers, copies of solicitations for bids or proposals; and copies of affirmative action plans.

d. How can businesses find Section 3 residents to work for them? By recruiting in the neighborhood and public housing developments to tell about available training and job opportunities. Distributing flyers, posting signs, placing ads, and contacting resident organizations and local community development and employment agencies to find potential workers are a few effective ways of getting jobs and people together.

e. All contracts awarded are subject to Section 3 requirements. Vendor shall seek to fill any and all position that are needed and unfilled with residents of KCDC communities. For additional information, please go to http://www.hud.gov/offices/fheo/section3/Section3.pdf. The successful vendor will supply KCDC with job announcements for any position that must be filled as a result of the award of KCDC work. Additionally the successful vendor will supply the same job announcement to the Knoxville-Knox County Committee Action Committee's Workforce Connections group. These can be faxed to 544-5269.

f. A Section 3 resident is one who lives within a public housing authority's site. It is also people who live in an area with a HUD assisted program and whose income is below HUD's low income requirements.

g. A Section 3 business is one that:

1. Is at least 51% owned by a Section 3 resident; or
2. Employs Section 3 residents for at least 30% of its employee base; or

3. Makes a commitment to sub contract at least 25% of the project's dollars to a Section 3 business.

h. Upon award, the successful vendor will supply two documents to KCDC:

1. A Section 3 Business determination (forms supplied by KCDC) provided one is not already on file.

2. A Section 3 Business plan for this work.

25. **SECURITY**

The successful vendor is responsible for providing (if necessary) any and all security to equipment, materials, personnel, tools and the site that are required for this job. KCDC is not responsible for damage or losses to equipment, materials, personnel, tools or the site.

26. **STORM WATER AND STREET ORDINANCES**

The City of Knoxville's Storm Water and Street Ordinances apply to this solicitation. The successful vendor will comply with all aspects of the City's ordinances. Compliance includes but is not limited to:

a. Retaining all sediments on the project site using structural drainage controls. Drainage control costs are incidental to the work.

b. No construction or demolition related materials, wastes, spills, or residues shall be discharged from the project site to streets, drainage facilities or adjacent properties by wind or runoff.

c. Non-storm water runoff from equipment and vehicle washing and any other activity shall be contained at the project site.

d. Eliminate erosion from slopes and channels by implementing Best Management Practices (BMPs) that may include, but not limited to, limiting grading scheduled during the wet season, inspecting graded areas during rain events, planning and maintaining vegetation on slopes, and covering erosion susceptible slopes.

e. Additional information about NPDES, BMPs, and the Land Development Manual is at the City of Knoxville's Storm water Engineering Division webpage: (http://www.cityofknoxville.org/engineering/stormwater/npdes.asp).

f. The successful vendor is responsible for all work, remediation, repair and monetary penalties or fines arising out of a Notice of Violation of the City of Knoxville's Storm water and Street Ordinances. Any cost incurred by KCDC to install structural drainage controls or remedy a Notice of Violation will be charged to the vendor and deducted from funds due for the work. KCDC shall also charge a $50 fee per violation for related administrative costs.

27. **SUBCONTRACTORS**

Subcontractors must:

a. Be approved by KCDC prior to beginning work.

b. Not be on HUD's Debarment List.

c. Carry the insurance coverages as outlined herein.

d. Not be changed without KCDC's permission.

e. Comply with the Davis Bacon requirements and submit certified payrolls.

28. **TIME FOR COMPLETION**

Once the notice to proceed is given, the successful vendor will complete the project within 420 calendar days.

29. **WAGE COMPLIANCE**

a. Federal Davis Bacon Wage Requirements apply to this work. This means that the successful vendor:

- Will submit certified payrolls that show compliance with the Davis Bacon requirements detailed herein. Failure to do so will be sufficient cause for withholding payment and/or termination of the contract.

- Must pay its employees at least weekly pursuant to the Davis Bacon determination listed herein.

- Will display all pages of Wage Posters, in a "prominent spot" at the job site. These are available at http://www.kcdc.org/Pages/Purchasing/Purchasing.aspx**.**

- Will allow KCDC to conduct on-site interviews of the vendor's employees to ascertain that Davis Bacon provisions are being followed. KCDC will use HUD forms and record the information.

- Classify employees by the applicable Davis Bacon classification. Classifications are determined by the work performed and the tools used-not on titles.

b. General Decision Information

General Decision Number	TN150023
Date	01-02-2015
State	Tennessee
Construction Types	Residential
Counties	Anderson and Knox Counties in Tennessee
Residential	Residential Construction Projects (consisting of single-family homes and apartments up to and including 4 stories.
Modification Number	0

c. Classifications and rates:

Classifications and Rates	Rate	Fringe 1
Bricklayer	$12.72	$0.00
Carpenter Including Cabinet Installation	$13.89	$0.00
Cement Mason/Concrete Finisher	$16.00	$0.00
Electrician	$18.52	$2.32
Laborer: Common or General	$8.00	$0.00
Laborer: Landscape	$12.33	$0.30
Operator: Backhoe	$13.17	$0.00
Plumber	$17.50	$0.00
Roofer: Including Shake and Shingle	$10.25	$0.00
Welders: Receive rate prescribed for craft performing operation to which welding is incidental.		

d. Vendors may not "use a classification" because there is not one listed that exactly identifies the work being performed. Unlisted Classifications needed for work not included within the scope of the classifications listed above may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)). To request an additional classification:

1. Write a brief letter to KCDC (upon award) stating the title needed and the proposed pay rate. Indicate that the employees agree with the rate and are in agreement with the rate. The rate must bear a reasonable resemblance to other rates on the classification.

2. If the additional classification is for a subcontractor, the subcontractor writes a similar letter to the General Contractor who then sends a cover letter to KCDC officially requesting the classification.

3. KCDC will review the request and forward it to HUD and officially request it or KCDC will suggest that the vendor revise the request.
4. HUD will review the request and approve it (or decline it) and send it to the Department of Labor for final approval.

5. The Department of Labor will either approve the request or recommend a different minimum rate.

6. HUD will notify KCDC of the decision.

7. Should either HUD or the Department of Labor require a higher minimum rate, KCDC will notify the vendor. The higher minimum rate, if any, must be paid for work completed (back wages) and for all future work under this project.

e. These requirements apply to all subcontractors that used by the successful vendor.

f. Davis Bacon rates are locked in at the bid opening provided that a contract is awarded within 90 days. If a contract is not awarded within 90 days after the bid opening and if a new decision is released, it will apply. Modifications released 10 days or less before a bid opening are not applicable as there is not time to incorporate the changes in the bid. In all cases however, KCDC is required to adhere to Davis Bacon standards as the Department of Labor determines - irrespective of any announcements KCDC may have made.

30. **WEATHER**

Since this solicitation calls for liquidated damages if the vendor exceeds the guaranteed number of days for completion, allowances are needed for excessive inclement weather.

a. EXTENSIONS OF CONTRACT TIME

If the basis exists for an extension of time in accordance with this solicitation, then an extension of time based on weather may be granted only for the number of weather delay days in excess of the number of weather days listed as the Standard Baseline for that month.

b. STANDARD BASELINE FOR AVERAGE CLIMATIC RANGE

The Standard Baseline is the normal and anticipated number of calendar days for each month during which adverse weather will prevent activity. Suspension of activity for the number of days each month as listed in the Standard Baseline is to be included in the work and not eligible for an extension of the contract time. The baseline is:

JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC
10	10	10	10	11	8	11	7	9	8	8	12

c. ADVERSE WEATHER AND WEATHER DELAY DAYS

1. Adverse weather is the occurrence of one or more of the following conditions which prevents only exterior activity or access to the site within a twenty-four hour period:

a. Precipitation (rain, snow, or ice) in excess of one-tenth inch (0.10”) liquid measure.

b. Temperatures which do not rise above 32 degrees Fahrenheit by 10:00 a.m.
c. Standing snow in excess of one inch (1.00”).

2. Adverse weather may include, if appropriate, “dry-out” or “mud” days when all of the following are met:

a. For rain above the Standard Baseline.

b. Only if there is a hindrance to site access or site work, such as excavation, backfill, and footings.

c. At a rate no greater than one make-up day for each day or consecutive days or rain beyond the Standard Baseline that total 1.0 inch or more, liquid measure, unless specifically recommended otherwise by the owner.

3. A weather delay day occurs only if adverse weather prevents work on the project for 50 percent or more of the vendor’s scheduled workday, including a weekend day or holiday if the vendor has scheduled construction activity that day.

d. DOCUMENTATION AND SUBMITTALS

1. Submit Daily Jobsite Work Log showing which and to what extent activities were affected by weather on a monthly basis.

2. Submit actual weather data to support a claim for the time extension obtained from nearest NOAA weather station or other independently verified source approved by the owner at the beginning of the project.

3. Maintain a rain gauge, thermometer, and clock at the jobsite. Keep daily records of precipitation, temperature, and the time of each occurrence throughout the project.

4. Use the Standard Baseline data provided in this section when documenting actual delays due to weather in excess of the average.

5. Organize claim and documentation to facilitate evaluation on a basis of calendar month periods, and submit in accordance with the procedures for claims established by the owner.

e. APPROVAL BY OWNER

1. If the extension of the contract time is appropriate, it will occur in accordance with the provisions of this solicitation.

2. Extra costs shall not be incurred by the owner for any extra time increase to the contract.

New Senior and Handicapped Housing Facility for Five Points Phase 1 C16002

Solicitation Document A General Response and Cost Section

General Information about the Vendor	
Sign Your Name to the Right of the Arrow → Your signature indicates that you have read and agree to "KCDC's General Instructions to Vendors" on **www.kcdc.org**.	
Printed Name and Title →	
Company Name →	
Street Address →	
City/State/Zip →	
Contact Person (Please Print Clearly) →	
Telephone Number →	
Fax Number →	
Cell Number →	
Vendor's e-mail address (Please Print Clearly) →	

Addenda

Addenda are not mailed but posted at www.kcdc.org. Click on "Doing Business With KCDC" and then on "Open Solicitations" to find addenda. Please check for addenda prior to submitting a bid.

Acknowledge addenda have been issued by checking below as appropriate:

None ☐	Addendum 1 ☐	Addendum 2 ☐	Addendum 3 ☐	Addendum 4 ☐	Addendum 5 ☐

Statistical Information

This business is owned & operated by persons at least 51% of the following ethnic background:

Asian/Pacific ☐	Black ☐	Hasidic Jew ☐	Hispanic ☐	Native ☐ Americans	White ☐

As defined on KCDC's webpage ("General Instructions to Vendors"), this business qualifies as:

Section 3 ☐	Small Business ☐	Woman Owned ☐

Total Project Cost in numerals	$

Enter the Total Project Cost in words in the block below (if this is discrepant with the numerals, the words prevail)

Vendor: _____

Alternate 1 - for deleting materials, equipment, labor and supervision necessary to install **Small Cupola's** shown in the construction documents from base bid	**$**
Alternate 2 - for deleting materials, equipment, labor and supervision necessary to install **Large Cupola** shown on construction documents from base bid	**$**
Alternate 3 - for deleting materials, equipment, labor and supervision necessary to install **Everlast Polymeric Siding** from base bid. Contractor to give an alternate price to provide materials, equipment, labor and supervision necessary to install painted **Hardi – siding and trim** in lieu of what is shown in the construction documents	**$**
Alternate 4 - for deleting materials, equipment, labor and supervision necessary to install **Fluid Applied Vaporer Barrier** from base bid. Contractor to give an alternate price to provide materials, equipment, labor and supervision necessary to install **House Wrap Vaporer Barrier** in lieu of what is shown in the construction documents.	**$**
Alternate 5 - for deleting materials, equipment labor and supervision necessary to install **Fiberglass Windows** from base bid. Contractor to give an alternate price to provide materials, equipment, labor and supervision necessary to install **Vinyl Windows** in lieu of what is shown in the construction documents.	**$**
Alternate 6 - for deleting materials, equipment labor and supervision necessary to install **FRP protection board and Chair rail** in corridors on all floors as shown in the construction documents from base bid. Contractor to paint from finished floor to finished ceiling and provide full height corner guards at all corridors if Alternate 6 is taken.	**$**
Alternate 7 - for deleting materials, equipment labor and supervision necessary to install **Full Brick as noted on elevation details 1, 2, & 3 on sheet A3.3** from base bid. Contractor to give an alternate price to provide materials, equipment, labor and supervision necessary to install **Brick, Horizontal Siding and Shake Siding as shown on details 1, 2, &3 on sheet A3.3.**	**$**
Alternate 8 - for deleting materials, equipment labor and supervision necessary to install **Vinyl Wall Covering** at lobby & common spaces on all floors as shown in the construction documents from base bid. Contractor to paint from finished floor to finished ceiling if Alternate 8 is taken.	**$**

Vendor: _____

Alternate 9 - for deleting materials, equipment labor and supervision necessary to install **Tackable Wall Covering** at Community Room on the first floor as shown in the construction documents from base bid. Contractor to paint from finished floor to finished ceiling if Alternate 9 is taken.	**$**
Unit Price 1 - CORNER GUARDS: Description: Provide a unit price per Linear Foot to provide and install corner guards per Finish Schedule Legend on Finish Drawings.	**$** **per L.F.**

New Senior and Handicapped Housing Facility for Five Points Phase 1 C16002

Solicitation Document B Affidavits

Vendor: _____

1. Vendor fully understands the preparation and contents of the attached offer and of all pertinent circumstances respecting such offer;
2. Such offer is genuine and is not a collusive or sham offer;
3. Neither the said vendor nor any of its officers, partners, owners, agents, representatives, employees or parties interest, including this affiant, has in any way colluded conspired, connived or agreed, directly or indirectly, with any other responder, firm, or person to submit a collusive or sham offer in connection with the award or agreement for which the attached offer has been submitted or to refrain from making an offer in connection with such award or agreement, or collusion or communication or conference with any other firm, or, to fix any overhead, profit, or cost element of the offer price or the offer price of any other firm, or to secure through any collusion, conspiracy, connivance, or unlawful agreement any advantage against KCDC or any person interested in the proposed award or agreement; and
4. The price or prices quoted in the attached offer are fair, proper and not tainted by any collusion, conspiracy, connivance, or unlawful agreement on the part of the firm or any of its agents, representatives, owners, employees, or parties in interest, including this affiant.
5. The vendor is not ineligible for employment on public contracts because of a conviction or guilty plea or a plea of nolo contender to violations of the Sherman Anti-Trust Act, mail fraud or state criminal violations with an award let by the State of Tennessee or any political subdivision thereof.
6. No commissioner or officer of KCDC or other person whose duty it is to vote for, let out, overlook or in any manner superintend any of the work for KCDC has a direct interest in the responder.
7. No employee, officer or agent of the grantee or subgrantee will participate in selection, or in the award or administration of an award supported by Federal funds if a conflict of interest, real or apparent, would be involved. Such a conflict would arise when the employee, officer or agent, any member of his immediate family, his or her partner, or an organization, which employs, or is about to employ, any of the above, has a financial or other interest in the firm selected for award.
8. The grantee's or sub-grantee's officers, employees or agents will neither solicit nor accept gratuities, favors or anything of monetary value from vendors, potential vendors, or parties to sub-agreements.
9. By submission of this form, the vendor is certifying that no conflicts of interest exist.

The undersigned hereby acknowledges receipt of the above applicable laws and verifies that the proposal submitted in response to this solicitation is in full compliance with the listed requirements.

Signed by	
Printed Name	
Title	
Subscribed and sworn to before me this date	
By (Notary Public)	
My Commission Expires on	

Representations, Certifications, and Other Statements of Bidders

Public and Indian Housing Programs

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1. Certificate of Independent Price Determination

(a) The bidder certifies that--

(1) The prices in this bid have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other bidder or competitor relating to (i) those prices, (ii) the intention to submit a bid, or (iii) the methods or factors used to calculate the prices offered;

(2) The prices in this bid have not been and will not be knowingly disclosed by the bidder, directly or indirectly, to any other bidder or competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a competitive proposal solicitation) unless otherwise required by law; and

(3) No attempt has been made or will be made by the bidder to induce any other concern to submit or not to submit a bid for the purpose of restricting competition.

(b) Each signature on the bid is considered to be a certification by the signatory that the signatory--

(1) Is the person in the bidder's organization responsible for determining the prices being offered in this bid or proposal, and that the signatory has not participated and will not participate in any action contrary to subparagraphs (a)(l) through (a)(3) above; or

(2) (i) Has been authorized, in writing, to act as agent for the following principals in certifying that those principals have not participated, and will not participate in any action contrary to subparagraphs (a)(l) through (a)(3) above.

_____ *[insert full name of person(s) in the bidder's organization responsible for determining the prices offered in this bid or proposal, and the title of his or her position in the bidder's organization];*

(ii) As an authorized agent, does certify that the principals named in subdivision (b)(2)(i) above have not participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above; and

(iii) As an agent, has not personally participated, and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above.

(c) If the bidder deletes or modifies subparagraph (a)2 above, the bidder must furnish with its bid a signed statement setting forth in detail the circumstances of the disclosure.

[ ] [Contracting Officer check if following paragraph is applicable]

(d) Non-collusive affidavit. (applicable to contracts for construction and equipment exceeding $50,000)

(1) Each bidder shall execute, in the form provided by the PHA/IHA, an affidavit to the effect that he/she has not colluded with any other person, firm or corporation in regard to any bid submitted in response to this solicitation. If the successful bidder did not submit the affidavit with his/her bid, he/she must submit it within three (3) working days of bid opening. Failure to submit the affidavit by that date may render the bid nonresponsive. No contract award will be made without a properly executed affidavit.

(2) A fully executed "Non-collusive Affidavit" [ ] is, [ ] is not included with the bid.

2. Contingent Fee Representation and Agreement

(a) Definitions. As used in this provision:

"Bona fide employee" means a person, employed by a bidder and subject to the bidder's supervision and control as to time, place, and manner of performance, who neither exerts, nor proposes to exert improper influence to solicit or obtain contracts nor holds out as being able to obtain any contract(s) through improper influence.

"Improper influence" means any influence that induces or tends to induce a PHA/IHA employee or officer to give consideration or to act regarding a PHA/IHA contract on any basis other than the merits of the matter.

(b) The bidder represents and certifies as part of its bid that, except for full-time bona fide employees working solely for the bidder, the bidder:

(1) [ ] has, [ ] has not employed or retained any person or company to solicit or obtain this contract; and

(2) [ ] has, [ ] has not paid or agreed to pay to any person or compan employed or retained to solicit or obtain this contract any commission, percentage, brokerage, or other fee contingent upon or resulting from the award of this contract.

(c) If the answer to either (a)(1) or (a)(2) above is affirmative, the bidder shall make an immediate and full written disclosure to the PHA/IHA Contracting Officer.

(d) Any misrepresentation by the bidder shall give the PHA/IHA the right to (1) terminate the contract; (2) at its discretion, deduct from contract payments the amount of any commission, percentage, brokerage, or other contingent fee; or (3) take other remedy pursuant to the contract.

3. Certification and Disclosure Regarding Payments to Influence Certain Federal Transactions (applicable to contracts exceeding $100,000)

(a) The definitions and prohibitions contained in Section 1352 of title 31, United States Code, are hereby incorporated by reference in paragraph (b) of this certification.

9. Certification of Eligibility Under the Davis-Bacon Act (applicable to construction contracts exceeding $2,000)

(a) By the submission of this bid, the bidder certifies that neither it nor any person or firm who has an interest in the bidder's firm is a person or firm ineligible to be awarded contracts by the United States Government by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(b) No part of the contract resulting from this solicitation shall be subcontracted to any person or firm ineligible to be awarded contracts by the United States Government by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(c) The penalty for making false statements is prescribed in the U. S. Criminal Code, 18 U.S.C. 1001.

10. Certification of Nonsegregated Facilities (applicable to contracts exceeding $10,000)

(a) The bidder's attention is called to the clause entitled **Equal Employment Opportunity** of the General Conditions of the Contract for Construction.

(b) "Segregated facilities," as used in this provision, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees, that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin because of habit, local custom, or otherwise.

(c) By the submission of this bid, the bidder certifies that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The bidder agrees that a breach of this certification is a violation of the Equal Employment Opportunity clause in the contract.

(d) The bidder further agrees that (except where it has obtained identical certifications from proposed subcontractors for specific time periods) prior to entering into subcontracts which exceed $10,000 and are not exempt from the requirements of the Equal Employment Opportunity clause, it will:

(1) Obtain identical certifications from the proposed subcontractors;

(2) Retain the certifications in its files; and

(3) Forward the following notice to the proposed subcontractors (except if the proposed subcontractors have submitted identical certifications for specific time periods):

Notice to Prospective Subcontractors of Requirement for Certifications of Nonsegregated Facilities

A Certification of Nonsegregated Facilities must be submitted before the award of a subcontract exceeding $10,000 which is not exempt from the provisions of the Equal Employment Opportunity clause of the prime contract. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

Note: The penalty for making false statements in bids is prescribed in 18 U.S.C. 1001.

11. Clean Air and Water Certification (applicable to contracts exceeding $100,000)

The bidder certifies that:

(a) Any facility to be used in the performance of this contract [ ] is, [ ] is not listed on the Environmental Protection Agency List of Violating Facilities:

(b) The bidder will immediately notify the PHA/IHA Contracting Officer, before award, of the receipt of any communication from the Administrator, or a designee, of the Environmental Protection Agency, indicating that any facility that the bidder proposes to use for the performance of the contract is under consideration to be listed on the EPA List of Violating Facilities; and,

(c) The bidder will include a certification substantially the same as this certification, including this paragraph (c), in every nonexempt subcontract.

12. Bidder's Signature

The bidder hereby certifies that the information contained in these certifications and representations is accurate, complete, and current.

(Signature and Date) _____

(Typed or Printed Name) _____

(Title) _____

(Company Name) _____

(Company Address)

New Senior and Handicapped Housing Facility for Five Points Phase 1 C16002

Solicitation Document D Good Faith Compliance Affidavit

The vendor must demonstrate a good faith effort to utilize Minority Owned Businesses (MOB) and Woman Owned Businesses (WOB). To assist in this effort, KCDC posts the web links of organizations, which can provide vendors with a list of minority, and women owned businesses on its web site. These lists can be useful to the vendor in preparing a response to this solicitation.

Place a checkmark in either Section One or Section Two of this form. Provide the information in Section One if you check that box.

Section One ☐

The following companies were asked for pricing for the attached bid. Provided the listed companies meet bid document requirements and their pricing is competitive, it is our intent to use the companies listed. Attached hereto or to be provided to KCDC within five calendar days of solicitation opening is our Form of Commitment/Statement of Effort (**failure to submit Form of Commitment/Statement of Effort timely will be cause to reject the bid**.)

Company Name	Person	Product/Service	MOB	WOB

Section Two ☐

MOB/WOB's were not contacted because sub-contractors suppliers will not be needed to complete the contract and all work will be completed by the vendor Other MOB/WOB's not shown above, will be considered during the duration of the contract in the event the vendor decides additional subcontractors or supplier will be used (to complete all or part of the contract).

Signed by	
Print Name and Title	
Subscribed and Sworn to before me on this date	
By	
Notary Public (stamp/signature)	
My Commission Expires on	

New Senior and Handicapped Housing Facility for Five Points Phase 1 C16002
Solicitation Document E Form of Commitment: Minority Owned Business/Woman Owned Business

Place a checkmark in either Section One or Section Two of this form.

Section One Does not apply-MOB/WOB subcontractors will not be used. ☐ (Stop Here)
Section Two MOB/WOB Subcontractors will be used. ☐ (Complete this page)

I, _____ do certify the firm has or will enter into a formal agreement with the MOB/WOB enterprise for work listed in this schedule.

Name of Firm	MOB	WOB	Contact Person	Type of Supplies to be Provided	Type of Work to be Performed	Dollar Value of Supplies or Service

Place an "X" in "MOB" or "WOB" as appropriate.

COMPLETE THE FOLLOWING BOXES IF BOX ABOVE WAS NOT COMPLETED

The following companies were listed on the Good Faith Compliance Affidavit submitted with my bid.

Company Name	Person	Product/Service	MOB	WOB

Explain why each of the above companies could not be used to provide the needed products or services.

Company Name	Reason

Above information submitted by _____

Printed/Typed Name and Title:_____

CAUTION!!

If a bid reaches or exceeds ***$25,000***, state law requires certain bidder license information be on the front of your envelope. As a condition of holding your license, you are to know these requirements.

KCDC provides the following page, the envelope cover sheet, as a courtesy. **You** are ultimately responsible for providing the correct information that is required to be on the front of your envelope. Failure to supply such information as is required by the State of Tennessee will invalidate your bid.

For more information go to: http://tn.gov/regboards/contractors/FAQ.shtml

Attach the following page, when properly completed, to the front of your bid envelope.

Do not put it inside the envelope.

THIS PAGE DOES NOT NEED TO BE RETURNED

New Senior and Handicapped Housing Facility for Five Points Phase 1 C16002

Solicitation Document G Envelope Coversheet

Bid/Contract Name	New Senior and Handicapped Housing Facility for Five Points Phase 1
Bid/Contract Number	C16002
Bid Due Date/Time	12-03-15 at 2:00 p.m.

Bidder's/Firm's Name	
State of Tennessee Contractor's License Holder Name	
State of Tennessee Contractor's License Number (matching the name above)	
State of Tennessee Contractor's License Classification Code Pertaining to this bid	
State of Tennessee Contractor's License Expiration Date	

Subcontractors to be used on this project (If subcontract work is not required, write "none required")

Electrical Subcontractor Name on the State of Tennessee's Contractor's License		**State of Tennessee Contractor License Number**	
State of Tennessee Contractor License Classification(s)		**Expiration Date of State Contractor's License**	
HVAC Subcontractor Name on the State of Tennessee's Contractor's License		**State of Tennessee Contractor License Number**	
State of Tennessee Contractor License Classification(s)		**Expiration Date of State Contractor's License**	
Masonry Subcontractor Name on the State of Tennessee's Contractor's License		**State of Tennessee Contractor License Number**	
State of Tennessee Contractor License Classification(s)		**Expiration Date of State Contractor's License**	
Plumbing Subcontractor Name on the State of Tennessee's Contractor's License		**State of Tennessee Contractor License Number**	
State of Tennessee Contractor License Classification(s)		**Expiration Date of State Contractor's License**	
Geothermal Subcontractor Name on the License issued by the Department of Environment & Conservation		**Department of Environment & Conservation Contractor License Number**	
Department of Environment & Conservation License Classification		**Expiration Date of Department of Environment & Conservation License**	

Advisement: KCDC will not consider notes changing the bid written on the bid envelope. Such notes must be inside the envelope.

DOCUMENT 00 0 01

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SECTION 011000

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E. Field Engineering.

F. Coordination.

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E. Section 01 40 00 – Quality Requirements.

F. Section 01 50 00 – Temporary Facilities and Controls.

G. Section 01 60 00 – Product Requirements.

H. Section 01 77 00 – Closeout Procedures.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. Work of this Contract consists of general construction of new residential facilities for the Five Points Infill Housing Project in Knoxville, Tennessee.

B. Items noted “Not in Contract” (NIC) will be furnished and installed by Owner.

C. Items noted Owner “Provided and Contractor Installed” (OPCI) will be furnished by the Owner and installed by Contractor. The Contractor is responsible for removal and transporting of (OPCI) items.

1.4 SEQUENCE OF CONSTRUCTION

A. Construct work in stages as may be required to accommodate owner’s occupancy requirements.

1.5 USE OF PREMISES

A. Limit use of premises for Work and for construction operations.

B. Coordinate use of premises under direction of Owner.

1.6 PRE-CONSTRUCTION CONFERENCE

A. Architect will administer site mobilization conference at Project site for clarification of Contractor responsibilities in use of Site and for review of administrative procedures.

1.7 FIELD ENGINEERING

A. Provide field engineering services; establish grades, lines, and levels, by use of recognized engineering survey practices. Verify locations and elevations of existing grades, utilities and existing conditions.

1.8 COORDINATION

A. Coordinate work of the various Sections in Specifications to assure efficient and orderly sequence of installation of constructions elements, with provisions for accommodating

items installed later.

B. Verify characteristics of elements of interrelated operating equipment are compatible; coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduits, as closely as practicable; make runs parallel with lines of building. Utilize

spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. In finished areas, except as otherwise shown, conceal pipes, ducts, and wiring in the construction. Coordinate locations of fixtures and outlets with finish elements.

E. Execute cutting and patching to integrate elements of Work, uncover ill-timed, defective, and non-conforming work, provide openings for penetrations of existing surfaces, and provide samples for testing. Seal penetrations through floors, walls, and ceilings.

1.9 DEFINITIONS AND EXPLANATIONS

A. Imperative language is used generally in the specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by the Contractor as if preceded by the phrase “The Contractor Shall”.

B. The term “provide” means furnish and install, complete, and ready for intended use.
   1. Except as otherwise defined in greater detail, the term “furnish” means supply and deliver to the project site, including unloading, unpacking, inspecting, and storing until ready for receipt by Owner, installation, etc., as applicable.
   2. Except as otherwise defined in greater detail, the term “install” is used to describe operations at project site including assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations, as applicable.
   3. The term “indicated” is a cross-reference to graphics, notes or schedules on drawings, to other paragraphs or schedules in the specifications, and to similar means of recording requirements in contract documents. Where terms such as “shown”, “noted”, “scheduled”, and “specified” are used in lieu of “indicated”, it is for purpose of helping reader locate cross-reference, and no limitation of location is intended.
   4. Where not otherwise explained, terms such as “directed”, “requested”, “authorized”, “selected”, “approved”, “required”, “accepted”, and “permitted”

mean “directed by architect”, “requested by Architect”, etc. However, no such implied meaning will be interpreted to extend Architect’s responsibility into Contractor’s area of construction supervision.

1.10 APPLICATIONS FOR PAYMENT

A. Submit properly notarized applications typed on AIA Document G702, Application and Certificate for Payment.

B. For continuation sheet, use format and data of accepted Schedule of Values.
   1. Provide dollar value in each column for each line item for portion of Work performed.
   2. List each authorized Change Order as an extension on continuation sheet, listing Change Order number and dollar amount as for an original item of work.

C. Submit three copies of each application for Payment at times stipulated in the Agreement.

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SECTION 01 10 01

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FIRE PROTECTION

FP1.1 PARTIAL FIRST FLOOR PLAN - BETHEL AVE - FIRE PROTECTION
FP1.2 PARTIAL FIRST FLOOR PLAN - MCCONNELL STREET - FIRE PROTECTION
FP1.3 PARTIAL SECOND FLOOR PLAN - BETHEL AVE - FIRE PROTECTION
FP1.4 PARTIAL SECOND FLOOR PLAN - MCCONNELL STREET - FIRE PROTECTION
FP1.5 PARTIAL THIRD FLOOR PLAN - BETHEL AVE - FIRE PROTECTION
FP1.6 PARTIAL THIRD FLOOR PLAN - MCCONNELL STREET - FIRE PROTECTION
FP1.7 ATTIC FIRE PROTECTION
FP2.1 FIRE PROTECTION SCHEDULES & DETAILS

ELECTRICAL

E1.1 FIRST FLOOR PLAN BETHEL AVE ELECTRICAL
E1.2 FIRST FLOOR PLAN MCCONNELL STREEL ELECTRICAL
E2.1 SECOND FLOOR PLAN BETHEL AVE ELECTRICAL
E2.2 SECOND FLOOR PLAN MCCONNELL STREET ELECTRICAL
E3.1 THIRD FLOOR PLAN BETHEL AVE ELECTRICAL
E3.2 THIRD FLOOR PLAN MCCONNELL STREET ELECTRICAL
E4.1 ENLARGED FLOOR PLANS ELECTRICAL
E5.1 LEGEND, SCHEDULES & DETAILS
E5.2 PANEBOARD SCHEDULES & FEEDER DIAGRAM
SE1.0 SITE ELECTRICAL PLAN

END OF SECTION

SECTION 01 21 00

ALLOWANCES AND UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:

1. Lump-sum allowances.
2. Unit-cost allowances.
3. Quantity allowances.
4. Contingency allowances.
5. Testing and inspecting allowances.

C. Related Sections include the following:

1. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders for allowances.
2. Division 1 Section "Unit Prices" for procedures for using unit prices.
3. Division 1 Section "Quality Requirements" for procedures governing the use of allowances for testing and inspecting.
4. Divisions 2 through 16 Sections for items of Work covered by allowances.

1.3 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect from the designated supplier.

1.4 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.5 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.6 LUMP-SUM, UNIT-COST, AND QUANTITY ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner under allowance and shall include taxes, freight, and delivery to Project site.

B. Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.7 CONTINGENCY ALLOWANCES

A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.

B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.

C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.

D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.8 TESTING AND INSPECTING ALLOWANCES

A. Testing and inspecting allowances include the cost of engaging testing agencies, actual tests and inspections, and reporting results.

B. The allowance does not include incidental labor required to assist the testing agency or costs for retesting if previous tests and inspections result in failure. The cost for incidental labor to assist the testing agency shall be included in the Contract Sum.

C. Costs of services not required by the Contract Documents are not included in the allowance.

D. At Project closeout, credit unused amounts remaining in the testing and inspecting allowance to Owner by Change Order.

1.9 UNUSED MATERIALS

A. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. If requested by Architect, prepare unused material for storage by Owner when it is not economically practical to return the material for credit. If directed by Architect, deliver unused material to Owner's storage space. Otherwise, disposal of unused material is Contractor's responsibility.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. Allowance No. 1 - BRICK: Allow the unit cost of two hundred eighty five dollars ($285.00) per thousand brick for material and taxes.

B. Allowance No. 2 – MORTAR: Allow the unit cost of thirteen dollars ($13.00) per bag plus tax for colored exterior mortar for brick masonry.

C. Allowance No. 3 – SIGNAGE: Allow the lump sum of twelve thousand dollars ($12,000) for payment of exterior and interior wall mounted signage

D. Allowance No. 4 - FIELD TESTING: Allow the lump sum of seven thousand five hundred dollars ($7,500) for payment of the following:
    a. Soil testing specified in Section 31 00 00.
    b. Testing of Asphaltic Concrete Paving specified in Section 32 12 16.
    c. Testing of Cast-In-Place concrete specified in Section 03 30 00.

E. Allowance No. 5 – EXTERIOR SITE FURNITURE: Allow the lump sum of twenty thousand dollars ($20,000) for payment of exterior furniture

F. Allowance No. 6 – INTERIOR FURNITURE: Allow the lump sum of three thousand dollars ($3,000) for one Study Carrels Model # P2SC 2472REFX / 3849 by Versteel or equal computer station at Community Room.

3.4 SCHEDULE OF UNIT PRICES:

A. Unit Price No. 1 – CORNER GUARDS: Description: Provide a unit price per Linear Foot to provide and install corner guards per Finish Schedule Legend on Finish Drawings.

END OF SECTION

SECTION 01 23 00

ALTERNATES

PART 1 – GENERAL

1.1 SUMMARY

A. This section identifies each Alternate by number and describes the basic changes to be made only when that Alternate becomes a part of the Work as approved by the Owner.

B. The Contractor shall coordinate pertinent related work and modify surrounding work as required to properly integrate the work under each Alternate providing complete construction required by the Contract Documents.

1.2 DEFINITIONS

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

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

1.3 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

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

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

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

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

PART 2 – PRODUCTS

(Not Used)

PART 3 – EXECUTION

3.1 SCHEDULE OF ALTERNATES

1. **Alternate "1"** – for deleting materials, equipment, labor and supervision necessary to install **Small Cupola's** shown in the construction documents from base bid

2. **Alternate "2"** – for deleting materials, equipment, labor and supervision necessary to install **Large Cupola** shown on construction documents from base bid

3. **Alternate "3" –** for deleting materials, equipment, labor and supervision necessary to install **Everlast Polymeric Siding** from base bid. Contractor to give an alternate price to provide materials, equipment, labor and supervision necessary to install painted **Hardi – siding and trim** in lieu of what is shown in the construction documents

4. **Alternate "4" –** for deleting materials, equipment, labor and supervision necessary to install **Fluid Applied Vaporer Barrier** from base bid. Contractor to give an alternate price to provide materials, equipment, labor and supervision necessary to install **House Wrap Vaporer Barrier** in lieu of what is shown in the construction documents.

5. **Alternate "5" –** for deleting materials, equipment labor and supervision necessary to install **Fiberglass Windows** from base bid. Contractor to give an alternate price to provide materials, equipment, labor and supervision necessary to install **Vinyl Windows** in lieu of what is shown in the construction documents.

6. **Alternate "6" –** for deleting materials, equipment labor and supervision necessary to install **FRP protection board and Chair rail** in corridors on all floors as shown in the construction documents from base bid. Contractor to paint from finished floor to finished ceiling and provide full height corner guards at all corridors if Alternate 6 is taken.

7. **Alternate "7" –** for deleting materials, equipment labor and supervision necessary to install **Full Brick as noted on elevation details 1, 2, & 3 on sheet A3.3** from base bid. Contractor to give an

alternate price to provide materials, equipment, labor and supervision necessary to install **Brick, Horizontal Siding and Shake Siding as shown on details 1, 2, &3 on sheet A3.3.**

8. **Alternate "8" –** for deleting materials, equipment labor and supervision necessary to install **Vinyl Wall Covering** at lobby & common spaces on all floors as shown in the construction documents from base bid. Contractor to paint from finished floor to finished ceiling if Alternate 8 is taken.

9. **Alternate "9" -** for deleting materials, equipment labor and supervision necessary to install **Tackable Wall Covering** at Community Room on the first floor as shown in the construction documents from base bid. Contractor to paint from finished floor to finished ceiling if Alternate 9 is taken.

END OF SECTION

SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

B. Related Sections include the following:

1. Division 1 Section "Allowances" for procedural requirements for handling and processing allowances.
2. Division 1 Section "Unit Prices" for administrative requirements for using unit prices.
3. Division 1 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
2. Within 5 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include costs of labor and supervision directly attributable to the change.
d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

C. Proposal Request Form: Use AIA Document G709 for Proposal Requests.

1.5 ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, base each Change Order proposal on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the Purchase Order amount or Contractor's handling, labor, installation, overhead, and profit. Submit claims within 5 days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. Owner will reject claims submitted later than 10 days after such authorization.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.7 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 29 00

PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Sections include the following:

1. Division 1 Section "Allowances" for procedural requirements governing handling and processing of allowances.
2. Division 1 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
3. Division 1 Section "Unit Prices" for administrative requirements governing use of unit prices.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

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

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

a. Application for Payment forms with Continuation Sheets.
b. Submittals Schedule.

c. Contractor's Construction Schedule.

2. Submit the Schedule of Values to Architect at earliest possible date but no later than 10 days before the date scheduled for submittal of initial Applications for Payment.
3. Subschedules: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.

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

1. Identification: Include the following Project identification on the Schedule of Values:

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

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

a. Related Specification Section or Division.
b. Description of the Work.
c. Name of subcontractor.
d. Name of manufacturer or fabricator.
e. Name of supplier.
f. Change Orders (numbers) that affect value.
g. Dollar value.

1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.

4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

    a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.

6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

7. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.

8. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

9. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

    1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Times: Progress payments shall be submitted to Architect based on Owner requirements. The period covered by each Application for Payment is one month.

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

E. Payment Application Forms: Use forms provided by Owner for Applications for Payment. Sample copies are included at end of this Section.

F. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

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

G. Transmittal: Submit 4 signed and notarized original copies of each Application for Payment to Architect. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

I. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.

4. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

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

1. List of subcontractors.
2. Schedule of Values.
3. Contractor's Construction Schedule (preliminary if not final).
4. Products list.
5. Schedule of unit prices.
6. Submittals Schedule (preliminary if not final).
7. List of Contractor's staff assignments.
8. List of Contractor's principal consultants.
9. Copies of building permits.
10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
11. Initial progress report.
12. Report of preconstruction conference.
13. Certificates of insurance and insurance policies.
14. Performance and payment bonds.
15. Data needed to acquire Owner's insurance.
16. Initial settlement survey and damage report if required.

K. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

L. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.

4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Administration of progress meetings and pre-installation conferences.

1.2 PROGRESS MEETINGS

A. Administer scheduled and called meetings.

B. Schedule meetings throughout progress of the Work at maximum bi-weekly intervals.

C. Make physical arrangements for meetings and prepare agenda with copies for participants.

D. Notify, for attendance, job superintendent, major subcontractors and suppliers, Owner, Architect, and Architect's consultants as appropriate to agenda topics for each meeting.

E. Suggested Agenda:
1. Review of Work progress.
2. Status of progress schedule and adjustments thereto.
3. Delivery schedules.
4. Submittals.
5. Maintenance of quality standards.
6. Pending changes and substitutions.
7. Other items affecting progress of Work.

1.3 PRE-INSTALLATION CONFERENCES

A. When required in individual specification Section, convene a pre-installation conference prior to commencing work of the Section.

B. Make physical arrangements for meetings and prepare agenda with copies for participants.

C. Notify and require attendance of entities directly affecting, or affected by, work of the

Section.

1. Obtain Architect's concurrence of scheduled dates.

D. Review conditions of installation, preparation and installation procedures, and coordination with related work.

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. List of Subcontractors and Principal Suppliers: Supplementing requirements of Article 5.2 of General Conditions.

B. Schedule of Values: Supplementing requirements of Article 9.2 of General Conditions.

C. Progress Schedule: Supplementing requirements of Article 3.10 of General Conditions.

D. Shop Drawings, Product Data, and Samples: Supplementing requirements of Article 3.12 of General Conditions.

1.2 PROCEDURE

A. Deliver or mail submittals to Kelley Hicks with Johnson Architecture, Inc., at 2240 Sutherland Avenue, Suite 105, Knoxville, Tennessee, 37919.
   1. Submittals from subcontractors and vendors will not be accepted.
   2. Do not submit directly to any of the Engineers or other Architect's consultants.
   3. For submittals requiring Consultants review, transmit an advance copy directly to Consultant to allow additional time for submittal review.

B. Transmit samples for all color selections on one submittal. No color selections will be made from an incomplete submittal.

C. Transmit each item under AIA Document G810, Transmittal Letter, or other Architect-accepted form.

D. For submittal of shop drawings, product data, and samples, as applicable:
   1. Identify Project, Contractor, subcontractor, and major supplier.
   2. Reference pertinent drawing sheet and detail number, and Specification Section number.
   3. Identify deviations from Contract Documents as such.
   4. Provide space for Contractor's, Architect's, and, when appropriate, Engineer's review stamps.

E. Comply with progress schedule for submittals related to work progress. Coordinate

submittal of related items.

F. After Architect's review of submittal, revise and resubmit as required, identifying changes made since previous submittal.

G. Distribute copies of reviewed submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.

1.3 LIST OF SUBCONTRACTORS AND PRINCIPAL SUPPLIERS

A. Submit list of subcontractors and principal suppliers within ten days after date of Owner-Contractor Agreement.
   1. Except for work to be performed with own forces, list names of subcontractors and the portion of work to be performed by each.
   2. List the suppliers, and where applicable, the proprietary names of principal items or systems of material and equipment.

B. When requested, submit evidence of reliability and responsibility of the subcontractors or suppliers to furnish and perform the Work.

C. Proposed subcontractors and principal suppliers, to whom the Architect and Owner have made no objection, must be used on the Work for which they are proposed.

D. Submit as part of Schedule of Values or as separate schedule coordinated with Schedule of Values.

E. When separate schedule is used, submit two copies which will be retained by the Architect.

1.4 SCHEDULE OF VALUES

A. Submit Schedule of Values within ten days after date of Owner-Contractor Agreement.

B. Submit schedule typed on AIA Document G703, Continuation Sheet.
   1. Follow Table of Contents of Project Manual for listing component parts. Identify each line item by number and title of Specifications section.
   2. List installed value of each major item of work and each subcontracted item of work as a separate line item to serve as a basis for computing values for Progress Payments. Round off values to nearest dollar.
   3. For each subcontract, list products and operations of that subcontract as separate line items.
   4. Include Cash Allowances within line item of Work.
   5. List Inspection testing Allowances in the specified monetary amount for each

allowance.

6. Component listings shall each include a directly proportional amount of contractor's overhead and profit.
7. For items on which payments will be requested for stored products, list sub-values for cost of stored products.

C. When the Architect requires substantiating information, submit data justifying line item amounts in question.

D. Coordinate listings with Progress Schedule.

E. Submit the number of opaque reproductions the Contractor requires plus two copies which will be retained by the Architect.

1.5 PROGRESS SCHEDULE

A. Submit initial schedule of construction progress within ten days after date of Owner-Contractor Agreement.

B. Prepare horizontal bar chart with separate bar for each major trade or operation, identifying first work day of each week.
1. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
2. Identify each item by Specification section number.
3. Identify work of separate stages and other logically grouped activities.
4. Show projected percentage of completion for each item of work as of time of each Application for Payment.
5. Show accumulated percentage of completion of each item, and total percentage of work completed, as of the first day of each month.

C. As part or as a separate schedule, provide schedule showing:
1. Submittal dates for shop drawings, product data and samples, and dates reviewed submittals will be required from Architect.
2. Decision dates for selection of finishes.
3. Delivery dates for Owner-furnished products and products specified under allowances.

D. Coordinate content with Schedule of Values.

E. Submit revised Progress Schedule with each Application for Payment.

F. Submit the number of opaque reproductions the Contractor requires plus two copies

which will be retained by the Architect.

1.6 SHOP DRAWINGS

A. Submit a shop drawing schedule within ten days after date of Owner-Contractor Agreement.

B. Prepare shop drawings as required by individual Specification sections.

C. Submit one opaque reproduction and one reproducible transparency.

1.7 PRODUCT DATA

A. Submit product data as required by individual Specification sections.

B. Mark each copy of standard printed data to identify pertinent product, applicable choice of accessories, and options.

C. Submit two opaque reproductions.

1.8 MANUFACTURERS' INSTRUCTIONS

A. Submit manufacturers' installation instructions as required by individual Specifications section.

B. Include manufacturer's printed instructions for delivery and storage, assembly, start-up, adjusting, and finishing, as applicable.

C. Submit two opaque reproductions.

1.9 SAMPLES

A. Submit samples as required by individual Specification section.

B. When required for product approval, submit samples to illustrate functional characteristics of the product with integral parts and attachment devices.
   1. Acceptable samples will be returned and may be used in the Work.

C. When required for Architect's selection, submit full range of available finishes indicating colors, textures, and patterns. After initial selection, submit samples, as required, of actual finish on the proper substrate.

D. Unless larger quantity is specified in individual Specification sections, submit three sets of samples of which one will be retained by the Architect.

E. After selection of finish, submit four samples of the selected finish. The Architect will prepare a master color guide to be used during the progress of the work.

1.10 ACTION ON SUBMITTALS

A. Evidence of the Contractor's compliance with Article 3.12.5 of the General Conditions is required prior to the Architect's review of shop drawings, product data, or samples. Submittals not bearing Contractor's approval stamp or statement that the submittal has been checked and approved will be returned without action by the Architect.

B. Following the Architect's review, shop drawings, product data, and samples will be returned bearing the Architect's stamp with one of the following markings:
   1. "Reviewed": Work may proceed providing it complies with Contract Documents.
   2. "Furnish as Noted": Work may proceed providing it complies with notations on submittal and with the Contract Documents.
   3. "Revise and Resubmit": Do not proceed with work. Revise submittal in accordance with notations thereon and resubmit to obtain a different action marking. Do not allow submittals with this action marking to be used in connection with performance of the work. In resubmitting, limit corrections to the items marked.
   4. "Rejected": Do not proceed with the work. Submittal is rejected for non-compliance with the Contract Documents or other justified cause. Correct the submittal and resubmit to obtain a different action marking. Do not allow submittals with this action marking to be used in connection with the performance of the work.

END OF SECTION

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Workmanship.

B. Manufacturer's Instructions.

C. Manufacturer's Certificates.

D. Field Samples.

E. Manufacturer's Field Services.

F. Testing Laboratory Services.

1.2 WORKMANSHIP

A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.

B. Perform work by persons qualified to produce workmanship of specified quality.

C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.3 MANUFACTURER'S INSTRUCTIONS

A. Comply with instructions in full detail, including each step in sequence. Should instructions conflict with Contract Documents, request clarification from Architect before proceeding.

1.4 MANUFACTURER'S CERTIFICATES

A. When required by individual specification sections, submit manufacturer's certificate, in duplicate, that products meet or exceed specified requirements.

1.5 FIELD SAMPLES

A. When required by individual specifications section, construct field samples at Project and at location acceptable to the Architect.

B. Construct field sample complete and finished incorporating products and procedures specified for the Work.

C. Upon acceptance by the Architect, use as a standard for the Work.

D. When directed by the Architect, remove field samples from the Project.

1.6 MANUFACTURER'S FIELD SERVICES

A. When specified in individual specification sections, require supplier or manufacturer to provide qualified personnel to observe field conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, or test, adjust, and balance of equipment as applicable, and to make appropriate recommendations.

B. Representative shall submit written report to Architect listing observations and recommendations.

1.7 TESTING LABORATORY SERVICES

A. Owner will employ and Contractor shall pay from cash allowances for services of an Independent Testing Laboratory to perform inspections, tests, and other services required by other individual specification sections.

B. Services will be performed in accordance with requirements of governing authorities and with specified standards.

C. Reports will be submitted to the Architect in duplicate giving observations and results of tests, indicating compliance or non-compliance with specified standards and with Contract Documents.

D. Contractor shall cooperate with Testing Laboratory personnel; furnish tools, samples of materials, submittal data, equipment, storage and assistance as required.
   1. Notify Architect and Testing Laboratory 24 hours prior to expected time for operations requiring testing services.
   2. make arrangements with Testing Laboratory and pay for additional samples and tests for Contractor's convenience.

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Electric Service and Wiring.

B. Lighting.

C. Water Service and Supply.

D. Heat and Ventilation.

E. Sanitary Facilities.

F. Field Offices and Sheds.

G. Telephone Service.

H. Barriers.

I. Enclosures

J. Seeding.

K. Access Roads and Parking Areas.

L. Security.

M. Protection of Installed Work.

N. Cleaning During Construction.

1.2 ELECTRIC SERVICE AND WIRING

A. Provide separate service metering for cost of electricity energy used.

B. Comply with Article 305 of National Electric Code.

C. Provide power distribution system sufficient to accommodate construction operations requiring power, use of power tools, electrical heating, lighting, and start-up testing of permanent electric-powered equipment prior to its permanent connection to electrical system.
   1. Provide weatherproof grounded system.
   2. Provide lighting and power outlets on separate circuits.
   3. Provide overload protection
   4. Provide 20A rated branch circuits feeding power outlets.

D. Provide power outlets spaced so any part of the building can be reached by a 50-foot extension cord for 120 volt appliances and 100-foot extension cord for 208 or 240 volt appliances.
   1. Distances measured horizontally along floor line.
   2. Power Outlets: Duplex receptacles, NEMA grounded type.

1.3 LIGHTING

A. Provide minimum illumination levels as follows:
   1. One lampholder for each 150 s.f. of interior rooms or exterior rooms without windows, minimum of one per room.
   2. One lampholder for each 250 s.f. of exterior rooms with windows, minimum of one per room.
   3. One lampholder at each floor of stairs.
   4. One lampholder 20 ft. on center in interior corridors, minimum of one per corridor.

B. Provide additional illumination as specified during installation of finish materials.

C. Lamp Holders: Pre-assembled stringer units.
   1. Equip with lamp guard protectors.
   2. Lamp with 100 W bulbs.

1.4 WATER SERVICE AND SUPPLY

A. Extend piping to ensure 30 psi minimum water pressure at hose outlets. Provide minimum 3/4” diameter hose of lengths sufficient to reach any part of the building from outlets.

1.5 HEAT AND VENTILATION

A. Provide temporary heat and ventilation as required to maintain specified conditions for

construction operations, to protect materials and finishes from damage due to temperature or humidity.

B. Provide ventilation of enclosed areas to cure materials, to disperse humidity, and to prevent accumulations of dust, fumes, vapors, or gases.

C. Prior to operation of permanent facilities for temporary heat and ventilation:
   1. Establish written agreement with Owner determining start of warranty.
   2. Verify system is complete with safety devices and operational automatic controls.
   3. Provide and maintain temporary filters.

1.6 SANITARY FACILITIES

A. At Contractor's option, provide either piped toilet facilities or portable self-contained units.

B. Designated permanent facilities, when operational, may NOT be used as temporary construction facilities.

1.7 FIELD OFFICES AND SHEDS

A. Provide adequate office space for field office personnel, suitably finished, furnished, and conditioned.
   1. Include separate space for project meetings, with table and chairs to accommodate not less than 8 persons.

B. Provide storage sheds, sized to storage requirements with adequate space for access and inspection of products.

1.8 TELEPHONE SERVICE

A. Provide minimum one line service to field office for construction use.

1.9 BARRIERS

A. Provide barricades and walkways for public rights-of-way and for public access to existing buildings.

B. Provide barriers to prevent public entry to construction areas and to provide for Owner's use of site. Construction to be of Contractor's option.

C. Provide barriers as required to protect existing facilities and adjacent properties from

damage during construction operations.

D. Provide barriers around existing trees designated to remain.
   1. Protect areas within drip lines from vehicular traffic, parking, and stored materials.

1.10 ENCLOSURES

A. Provide temporary partitions and ceilings as required to separate work areas from Owner occupied areas.
   1. Seal joints and intersections with existing surfaces to prevent penetration of dust.
   2. Construct of exposed materials having flame spread rating of 25 of less, in accordance with ASTM E84-84.
   3. Insulate with material having thermal resistance value of 13, determined in accordance with ASTM C687-71.
   4. Construct to provide STC rating of 50, determined in accordance with ASTM E90-85.
   5. Paint surfaces exposed to view in Owner occupied areas.

B. Provide temporary weather-tight closures of openings in exterior surfaces as required to provide protection from weather and unsatisfactory ambient conditions for the work.

1.11 SEEDING

A. Provide temporary seeding as required for erosion control.

B. Materials:
   1. Seed: 100 percent annual rye grass.
   2. Mulch: Wheat, rye, or oat straw.

C. Apply seed at rate of 2 lbs. Per 1,000 s.f., evenly.
   1. Rake seed lightly into top 1/4” of soil.

D. Apply minimum 1-1/2” mulch, spread uniformly.

1.12 ACCESS ROADS AND PARKING AREAS

A. Provide all-weather uninterrupted access to construction area.

B. Provide temporary parking area for personnel and equipment.

1.13 SECURITY

A. Protect Owner-occupied areas from unauthorized entry.

B. Protect Work and Owner-furnished equipment from theft and vandalism.

C. At earliest possible date, secure building against unauthorized entrance at times when personnel are not working,
   1. Provide secure temporary enclosure at ground floor and other locations of entry, with locked entrances.

1.14 PROTECTION OF INSTALLED WORK

A. Protect installed products and control traffic in immediate area to prevent damage from subsequent operations.

B. Provide protective coverings at walls, projections, jambs, sills, and soffits at openings in traffic areas.

C. Protect finished floors and stairs from traffic, movement of heavy objects, and storage.

D. Restrict traffic and storage on lawn and landscaped areas.

1.15 CLEANING DURING CONSTRUCITON

A. Maintain areas free of waste materials, debris, and rubbish.
   1. Maintain site in a clean and orderly condition.
   2. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces prior to closing the space.

B. Periodically clean interior areas to provide suitable conditions for Work.

C. Broom clean interior areas prior to start of surface finishing.

D. Remove waste materials, debris, and rubbish from site periodically and dispose of off-site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Contractor’s option; adequate for required purpose.

B. Materials may be new or used.

PART 3 - EXECUTION

3.1 RELOCATION AND REMOVAL

A. Relocate temporary materials, equipment, services, and construction as required by progress of Work.

B. Remove temporary materials, equipment, services, and construction prior to Substantial Completion inspection.

C. Clean and repair damage caused by installation or use of temporary facilities.
   1. Restore existing facilities used during construction to specified, or to original, condition.

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Products.

B. Reference Standards.

C. Transportation and Handling.

D. Storage and Protection.

E. Product Options.

F. Products List.

G. Substitutions.

1.2 PRODUCTS

A. Products include material, equipment, and systems.

B. Comply with Specifications and referenced standards as minimum requirements.

C. Components required to be supplied in quantity within a Specification section shall be the same, and shall be interchangeable.

D. Do not use materials and equipment removed from existing structure, except as specifically required, or allowed, by Contract Documents.

1.3 REFERENCE STANDARDS

A. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements and are specified or are required by applicable codes.

B. The date of the standard is that in effect as of the date of the Contract documents, except when a specific date is specified.

C. When required by individual Specification section, obtain copy of standard. Maintain copy at job site during submittals, planning and progress of the specific work and until Substantial Completion.

1.4 TRANSPORTATION AND HANDLING

A. Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturer's unopened containers or packaging.

B. Provide equipment and personnel to handle products by methods to prevent soiling or damage.

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

1.5 STORAGE AND PROTECTION

A. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.

B. For exterior storage of fabricated products, place on supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.

C. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.

D. Arrange storage to provide access for inspection. Periodically inspect to assure products are undamaged, and are maintained under required conditions.

1.6 PRODUCT OPTIONS

A. Products Specified by Reference Standards of by Description Only: Any product meeting those standards.

B. Products Specified by Naming one or more Manufacturers: Provide the specified product or equivalent product by other acceptable manufacturers listed in the individual specification section only.
   1. Equivalent product means a substantially similar product or system. Minor deviations will be acceptable in order to utilize acceptable manufacturer's standard product or system provided the differences do not detract from the

design concept or intended performances, judged solely by the Architect.

C. Products Specified with the Phrase “No Substitutions Permitted” added:
   1. Furnish the specified product.
   2. No options nor substitutions allowed.

1.7 PRODUCTS LIST

A. Within ten days after date of Owner-Contractor Agreement, submit list of products

proposed for use, with name of manufacturer, trade name, and model number of each product.

B. Include all products specified as being equivalent product by acceptable manufacturer.

C. After acceptance of Product List by Architect, changes will be considered as substitutions.

1.8 SUBSTITUTIONS

A. During bidding, Architect will consider substitutions in accordance with the Instructions to Bidders, Article 3.3. After date of Owner-Contractor Agreement, Architect will consider requests from Contractor for substitutions only when a product becomes unavailable due to no fault of Contractor.

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

C. Request constitutes a representation that Contractor:
   1. Has investigated proposed product and determined that it meets or exceeds, in all respects, specified product.
   2. Will provide the same warranty for substitution as for specified product.
   3. Will coordinate installation and make other changes which may be required for Work to be complete in all respects.
   4. Waives claims for additional costs which 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 substantial revision of the Contract Documents.

E. Architect will determine acceptability of proposed substitution, and will notify Contractor of acceptance or rejection in writing within a reasonable time.

END OF SECTION

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Final Cleaning: Supplementing requirements of Article 3.15 of the General Conditions.

B. Pest Control.

C. Project Record Documents: Supplementing requirements of Article 3.11 of the General Conditions.

D. Operation and Maintenance Data.

E. Instruction of Owner Personnel.

F. Insurance, Warranties, and Bonds.

G. Extra Stock, Spare Parts, and Maintenance Materials.

1.2 CLOSEOUT PROCEDURES

A. Comply with procedures stated in General Conditions of the Contract for issuance of Certificate of Substantial Completion.

B. Should status of completion of Work require reinspection by Architect due to failure of Work to comply with Contractor's claims on initial inspection, Owner will deduct the amount of Architect's compensation for reinspection services from final payment to Contractor.

C. In addition to submittals required by the conditions of the Contract, provide submittals required by governing authorities, and submit a final statement of accounting giving total adjusted Contract Sum, previous payments, and sum remaining due.

D. Unless specified or directed otherwise, make submittals to Architect with letter of transmittal containing date, project title, Contractor's name and address, and list of documents.

1.3 FINAL CLEANING

A. Execute prior to inspection for substantial completion.

B. Provide cleaning as required:
   1. Clean interior and exterior surfaces exposed to view; remove temporary labels, stains, and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
   2. Clean equipment and fixtures to a sanitary condition.
   3. clean or replace filters of mechanical equipment.
   4. Clean site; sweep paved areas, rake clean other surfaces.

C. Remove waste and surplus materials, rubbish, and construction facilities from the Project and from the site.

D. Owner will assume responsibility for cleaning after time and date established by AIA Document G704, Certificate of Substantial Completion.

1.4 PEST CONTROL

A. Engage a licensed exterminator to make a final inspection of project and to rid project of rodents, insects, and other pests.

1.5 PROJECT RECORD DOCUMENTS

A. General Contractor is responsible to submit project record documents to the Owner with all as-built conditions noted for the Work including all trades and subcontractors.

B. Store documents separate from those used for construction.

C. Record locations of concealed utilities and appurtenances, modifications, field changes, and details on Contract Documents.

D. Keep documents current; do not permanently conceal any work until required information has been recorded.

E. Submit within 10 days after Date of Substantial Completion and prior to final Application for Payment.

1.6 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data for building products, equipment, and systems as required by individual specification section.

B. For products, provide instructions and schedule for cleaning and maintenance.

C. For equipment and systems, provide operating instructions, maintenance requirements and schedule, and parts lists.

D. For systems, include description of system and component parts, operating characteristics, and engineering data.

E. Submit building products, each major equipment item, and each system in separate three-ring binders. For each item, provide tab and typed information sheet including company

name, address, telephone number, and name of responsible principal for subcontractor, supplier, manufacturer, and local source of supplies and replacement parts.

F. Submit within 10 days after Date of Substantial Completion and prior to final application for payment.

1.7 INSTRUCTION OF OWNER PERSONNEL

A. Prior to final inspection instruct Owner's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times. For equipment requiring seasonal operation, perform instructions for other season within six months.

B. Use operation and maintenance manuals as basis of instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

C. Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction.

1.8 INSURANCE, WARRANTIES, AND BONDS

A. Submit Certificate of Insurance for Products and Completed Operations Insurance.

B. Submit warranties and bonds as required in individual specification sections. Have warranties and bonds executed by responsible subcontractors, suppliers, and manufacturers. Co-execute submittals when required.

C. Submit in three-ring binder. For each item, provide tab and typed information sheet including company name,. Address, telephone number, and name of responsible principal for subcontractor, supplier and manufacturer.

1.9 EXTRA STOCK, SPARE PARTS, AND MAINTENANCE MATERIALS

A. Furnish extra stock, spare parts, and maintenance materials in quantities specified in individual specification sections.

B. Furnish within 10 days after Date of Substantial completion and prior to final Application for Payment.

C. Package or wrap materials requiring protection from soiling.

D. Properly label materials not adequately identified on package. Include when appropriate, areas where used.

E. Deliver to Owner at Project Site. Obtain receipt.

END OF SECTION

GEOServices, LLC-Geotechnical and Materials Engineers

August 14, 2015

Knoxville's Community Development Corporation
901 Broadway North East
Knoxville, Tennessee 37917

ATTENTION: Mr. Art Cate, Executive Director

Subject: **REPORT OF GEOTECHNICAL EXPLORATION**
KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project No. 21-15445R1

Dear Mr. Cate:

We are submitting the results of the geotechnical exploration performed for the subject project. The geotechnical exploration was performed, as authorized by you, in accordance with our Proposal No. 11-15185, dated July 1, 2015. The following report presents our findings and recommendations for the proposed project. Should you have any questions regarding this report, or if we can be of any further assistance, please contact us at your convenience.

Sincerely,
GEOServices, LLC

Matthew T. Bible, E.I
Staff Professional

Dennis A. Huckaba, P.E.
Principal

ADAM CLINT ALEXANDER
REGISTERED ENGINEER
AGRICULTURE
8-14-15
COMMERCE
No. 114515
STATE OF TENNESSEE

Adam C. Alexander, P.E.
Geotechnical Manager
TN 114,515

ACA/DAH/mtb

REPORT OF GEOTECHNICAL EXPLORATION

KCDC Senior Housing Facility

KNOXVILLE, TENNESSEE

Submitted to:

Knoxville's Community Development Corporation
901 Broadway North East
Knoxville, Tennessee 37917

Submitted by:

GEOServices, LLC
2561 Willow Point Way
Knoxville, Tennessee 37931

Phone (865) 539-8242
Fax (865) 539-8252

GEOSERVICES, LLC

PROJECT NO. 21-15445R1

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1.0 INTRODUCTION

1.1 PURPOSE

The purpose of our geotechnical exploration was to explore the subsurface conditions and provide general recommendations for site preparation/grading and for design and construction of the foundation system, including allowable bearing pressure. Additionally, recommendations for light-duty and heavy-duty pavements are also included.

1.2 PROJECT INFORMATION AND SITE DESCRIPTION

The project site is located along Bethel Avenue, at the northwestern quadrant of its intersection with McConnell Street in Knoxville, Tennessee. Project information was provided by Mr. Orlando Diaz, with Partners Development, via email correspondence in the form of an untitled and undated site plan. Based on the provided information, it is our understanding that the proposed construction will consist of a new Knoxville Community Development Corporation (KCDC) senior housing facility and the associated parking and drive areas. Furthermore, we understand that the proposed building will be three stories in height and occupy a plan footprint of approximately 70,000 square feet (sf).

It is our understanding that the proposed building will be constructed as a wood-framed structure with a glass or brick veneer bearing on a conventional system of shallow foundations and concrete slabs-on-grade. Information regarding the anticipated foundation loads was also not provided at this time. However, based on our experience with similar construction we have assumed that the proposed buildings will have maximum column and continuous foundations loads of less than 150 kips and 4 to 6 kips per linear foot, respectively.

Based on available topographic information, the project site is generally level, sloping gently downhill from a maximum elevation of approximately 960 feet mean sea-level (MSL) along the property's southern border along Bethel Avenue to a minimum elevation of approximately 952 feet MSL along the property's northern border along Kenner Avenue. Finished graded were not provided at this time. However, we have assumed that the finished grades will be at, or near, the

existing grades on site. Therefore, we anticipate maximum earthwork cuts and fills of less than 10 feet will be required to reach finished grade elevations.

The project site currently consists as undeveloped property with ground cover consisting of short grasses and bare earth. It should be noted that upon review of historical aerial photography, the property has recently been occupied by multiple buildings and structures that have previously been removed. The project site is bordered by Kenner Avenue to the north, McConnel Street to the east, Bethel Avenue to the south and an existing church/wooded property to the east.

1.3 SCOPE OF STUDY

This geotechnical exploration involved a site reconnaissance, field drilling, laboratory testing, and engineering analysis. The following sections of this report present discussions of the field exploration, site conditions, and conclusions and recommendations. Following the text of this report, Appendix A presents figures and test boring records and Appendix B presents a summary of laboratory test results.

The scope of our geotechnical engineering services did not include an environmental assessment for determining the presence or absence of wetlands, or hazardous or toxic materials in the soil, bedrock, surface water, groundwater, or air, on, or below, or around this site. Any statements in this report or on the boring logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for informational purposes.

2.0 EXPLORATION AND TESTING PROGRAMS

2.1 FIELD EXPLORATION

The existing subsurface conditions were explored with fourteen (14) soil test borings, ten (10) borings were drilled within the proposed building footprint and the remaining four (4) borings were drilled in the parking/drive areas. The boring locations were staked in the field by GEOServices personnel using the provided site plan and a hand held GPS unit. Drilling was

performed July 24, 2015 by our subcontractor. The borings were advanced using 3.25-inch inside diameter hollow stem augers (HSA) with a CME 55 truck mounted drill rig. The approximate locations of the test borings performed on site are referenced in Figure 2 of Appendix A of this report. Detailed logs for soil test borings can also be found in Appendix A.

Within each boring, standard penetration testing (SPT) and split-spoon sampling were performed at 2-1/2-foot intervals in the upper 10 feet and at 5-foot intervals thereafter. The borings extended to depths ranging from 15 to 25 feet or auger refusal, whichever was encountered first. If auger refusal materials were encountered prior to termination depth, the boring was terminated (i.e., no rock coring was performed). The drilling was performed in accordance with ASTM D6151 (hollow stem auger drilling). SPT and split-spoon sampling were performed in accordance with ASTM D 1586.

In split–spoon sampling, a standard 2-inch O.D. split-spoon sampler is driven into the bottom of the boring with a 140 pound hammer falling a distance of 30 inches. The number of blows required to advance the sampler the last 12 inches of the standard 18 inches of total penetration is recorded as the Standard Penetration Resistance (N-value). These N-values are indicated on the boring logs at the testing depth, and provide an indication of consistency of cohesive materials.

2.2 LABORATORY TEST PROGRAM

After completion of the field drilling and sampling phase of this project, the soil samples were returned to our laboratory where they were visually classified in general accordance with the Unified Soil Classification System (USCS – ASTM D 2487) by a GEOServices geotechnical professional. Select samples were then tested for natural moisture content (ASTM D 2216) and Atterberg limits determinations (ASTM D 4318). The laboratory test results are further discussed in the following sections of this report and a summary is provided in Appendix B.

3.0 SUBSURFACE CONDITIONS

3.1 GEOLOGIC CONDITIONS

The project site, and most of east Tennessee, lies in the Appalachian Valley and Ridge Physiographic Province. The Province is characterized by elongated, northeasterly-trending ridges formed on highly resistant sandstones and shales. Between ridges, broad valleys and rolling hills are formed primarily on less resistant limestones, dolomites and shales.

Published geologic information indicates that the site is underlain by the Ottosee Shale member of the Chickamauga Group. The Ottosee Shale is a mixture of fossiliferous shale and limestone with minor quantities of siltstone, sandstone and marble. Within a limited area, any one of these rock types may dominate. The various rock types grade into and interfinger with one another throughout the section. The shale portion of the formation typically weathers to produce a tan or yellowish brown silty clay residuum with weathered shale fragments. The limestone portions of the formation weather to a reddish or orangish-brown clay residuum.

Since the Ottosee Shale contains limestone, the site is susceptible to the typical carbonate hazards of irregular weathering, cave and cavern conditions, and overburden sinkholes. Carbonate rock, while appearing very hard and resistant, is soluble in slightly acidic water. This characteristic, plus differential weathering of the bedrock mass, is responsible for the hazards. Of these hazards, the occurrence of sinkholes is potentially the most damaging to soil supported structures. In East Tennessee, sinkholes occur primarily due to differential weathering of the bedrock and “flushing” or “raveling” of overburden soils into the cavities in the bedrock. The loss of solids creates a cavity or “dome” in the overburden. Growth of the dome over time or excavation over the dome can create a condition in which rapid, local subsidence or collapse of the roof of the dome occurs.

A certain degree of risk with respect to sinkhole formation and subsidence should be considered with any site located within geologic areas underlain by potentially soluble rock units. While a rigorous effort to assess the potential for sinkhole formation on this site was beyond the scope of

this evaluation, our borings did not encounter obvious indications of sinkhole development. However, closed depressions, which indicate sinkhole activity, are shown on the United States Geological Survey (USGS – Knoxville Quadrangle, TN) topographic map within 1,500 feet of this site. It is also possible that carbonate features requiring remediation will be discovered during construction. Based on these findings and our experience with these formations at other sites, we consider that this site has a moderate potential for sinkhole activity.

Based on this information, it is our opinion that the risk of sinkhole development at this site is no greater than at other sites located within similar geologic settings which have been developed successfully. However, the owner must be willing to accept a low to moderate risk of sinkhole development at this site. The risk of sinkhole development can be reduced by following the recommendations provided in the *Sinkhole Risk Reduction and Corrective Actions* (Section 5.6) section of this report.

3.2 SOIL STRATIGRAPHY

The following subsurface description is of a generalized nature to highlight the subsurface stratification features and material characteristics at the boring locations. The boring logs included in Appendix A of this report should be reviewed for specific information at each boring location. Information on actual subsurface conditions exists only at the specific boring locations and is relevant only to the time that this exploration was performed. Variations may occur and should be expected at the site.

Surficial

Each soil test boring drilled, excluding B-14, encountered a layer of topsoil that ranged from 3 to 5 inches in thickness. Boring B-14 encountered a surficial layer of asphalt and basestone, approximately 3 inches and 6 inches in thickness, respectively.

Fill Soils

Beneath the existing surficial layers, existing fill soil was encountered in six of the fourteen soil test borings conducted (B-2, B-3, B-6, B-7, B-10 and B-12) to depths ranging from 3.0 to 5.0 feet

beneath the existing ground surface. Fill is generally classified as soils that have been transported and placed by man. The fill soils generally consisted of orangish brown, light brown and reddish brown (CH) with varying amounts of rock fragments, sand and organics. The SPT N-values used to evaluate the consistency of the fill soil encountered ranged from 7 to 15 blows per foot (bpf) indicating a relative soil consistency of firm to stiff. The in-situ moisture content of selected samples of fill material ranged from about 20 to 22 percent.

Residual Soil

Beneath the existing fill soils encountered in six borings (B-2, B-3, B-6, B-7, B-10 and B-12), and beneath the surficial layers encountered in the remaining borings, residual soils were encountered to depths ranging from 23 to 25 feet beneath the surface. Residual soils are formed from the in place weathering of the underlying parent bedrock. The residual soils generally consisted of orangish brown, reddish brown and light brown fat clay (CH) with shale like structure, varying amounts of shale. The SPT N-values used to evaluate the consistency of the residual soil ranged from 4 bpf to 26 bpf, indicating a relative soil consistency ranging from soft to very stiff. However, the soft consistency soils (N-values of 4 or less) are isolated to one boring (B-6) at a depth of approximately 19 feet below existing ground surface. Therefore, the residual soil encountered was generally firm to very stiff in consistency.

The natural moisture content of selected samples of residual material ranged from about 26 to 42 percent. It is also noted that the samples were typically determined to be “moist” when visually classified. Additionally, the moisture contents generally increased with depth. Atterberg limits testing on the residual soil samples resulted in liquid limits (LL) of 65 and 70 percent and plasticity indices (PI) of 37 and 38 percent, respectively. The existing residual soils tested are classified as fat clays (CH) in accordance with the Unified Soil Classification System (USCS).

Weathered Shale

Beneath the residual soils encountered in two borings (B-9 and B-10), weathered rock was encountered to a depth of 25 feet beneath the existing ground surface. The weathered rock encountered was generally brown weathered shale. The SPT N-value, used to evaluate the consistency of the weathered rock encountered, ranged from 50 blows with 4 inches of

penetration to 50 blows with 3 inches of penetration, indicating a relative soil consistency of very hard.

Auger Refusal

Auger refusal was not encountered in any of the borings performed on site. Auger refusal is a designation applied to any material that cannot be penetrated by the power auger. Auger refusal may indicate dense gravel or cobble layers, boulders, rock ledges or pinnacles, or the top of continuous bedrock.

Ground Water

Ground water was encountered at the completion of boring B-6 drilled on site at a depth of 5.8 feet below the existing ground surface. This groundwater depth is not likely conducive of the actual groundwater depth across the site as it was not encountered in any other borings. In addition, significant rainfall encountered the day that boring B-6 was drilled, so the groundwater measure in the bottom of the boring is likely from surface water runoff. Subsurface water levels may fluctuate due to seasonal changes in precipitation amounts. Additionally, areas of perched water may exist in the overburden and/or near the contact with bedrock. The contractor should determine the actual subsurface water level at the time of construction.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 SITE ASSESSMENT

The results of the subsurface exploration indicate that the site is generally overlain by isolated existing fill soils and residual soils. The fill soil was encountered across the site to depths ranging from 3 to 5 feet beneath the existing ground surface and was generally firm, or better, in consistency. The residual soil encountered was generally stiff, or better, in consistency with isolated firm zones encountered in the upper 3 feet in four borings (B-1, B-4, B-5, and B-11). Based on the results of our geotechnical exploration, it is our opinion that the site is generally adaptable for the proposed construction. However, the unknown placement and testing of the

existing fill soil and its associated risks should be addressed prior to construction. Additionally, there are risks associated with the presence of the previously demolished buildings at the site.

Information pertaining to the age, placement, and compaction of the existing fill was unavailable at the time of this report. There are risks associated with construction on undocumented fill material. The owner should be aware of these risks if the existing fill will be utilized for structural support or pavement subgrade. These risks include soft compressible zones not disclosed by our soil test borings. Also, fill material may be encountered in areas not explored that could contain abundant organic matter, compressible zones, debris, and other deleterious materials. These materials, if present, could lead to differential settlement of the proposed structures, potentially causing structural distress.

Eliminating the risk of the existing fill material would require a full depth undercut and replacement of the existing fill material, which may be cost prohibitive for the proposed project. If the owner is not willing to accept the risk associated with the existing fill, we recommend that the existing fill material be removed and replaced with properly placed structural soil fill. However, as mentioned previously, the existing fill was observed to be firm, or better, in consistency and generally free of any deleterious material. Given the relatively shallow depths that the fill material was encountered (3 to 5 feet) some of the risk associated with the existing fill material will likely be removed upon excavating the proposed foundations. Therefore, we recommend that the existing fill material be closely observed upon construction during foundation excavations and earthwork grading. During foundation excavations, any unsuitable fill material encountered can be over-excavated and replaced with concrete or flowable fill. In the areas of the proposed concrete slab-on-grade and the proposed parking areas, we recommend that the suitability of the existing fill material be thoroughly evaluated during proofrolling observations and remediated accordingly.

As the site has been previously occupied by multiple structures, there is a risk of encountering construction remnants associated with these structures (e.g. foundations and/or slabs that were not removed, abandoned utilities, etc.). If remnants are encountered during grading operations, these materials should be completely removed and replaced with newly compacted fill placed in accordance with our compacted fill recommendations provided herin.

Upon removal of surficial layers and unsuitable fill (as required), we recommend that the exposed subgrade be thoroughly proofrolled with a fully loaded (with soil or rock), tandem-axle dump truck or other pneumatic tired construction equipment of similar weight. A GEOServices geotechnical engineer, or qualified representative, should observe proofrolling of all structural soil fill subgrade and concrete slab on grade subgrade prior to placement of fill or basestone. As mentioned previously, some remediation of the residual soil should be anticipated. However, the extent of these areas will likely be dependent on the contractor's schedule and the time of construction. Any areas observed to be unsuitable for use as subgrade should be remediated at the geotechnical engineer's direction. Remediation of these areas would likely consist of an undercut and replacement with structural soil fill or compacted dense graded aggregate. For budgeting purposes, the owner should anticipate remediation of the upper 3 feet of soil overburden will be required to reach a stable residual soil subgrade in the area of borings B-1, B-4, B-5, and B-11.

Lastly, we recommend close foundation subgrade observations be performed by a qualified geotechnical engineer upon excavation of the proposed foundations. Any unsuitable areas observed upon foundation excavations should be undercut and replaced with compacted dense graded aggregate or lean concrete (flowable fill).

Based on the conditions encountered in the geotechnical exploration and provided the recommendations set forth in the following sections of this report are followed, the proposed structure can be supported using conventional shallow foundations and/or concrete slabs-on-grade bearing in the stiff or better residual soil and/or newly placed structural soil fill.

4.2 SITE PREPARATION RECOMMENDATIONS

4.2.1 Subgrade

Initially, all topsoil and deleterious materials (if encountered), as well as existing utilities (if required), loose rock fragments greater than 6 inches, and other debris must be removed from the areas proposed for construction and the resulting excavations backfilled with compacted fill as described below. Stripping operations should extend a minimum of 5 feet beyond the limits of

proposed pavement areas and 10 feet beyond building limits. These areas should be observed by a geotechnical engineer upon grading to ensure the recommendations in this report are followed.

After completion of stripping operations and any required excavations to reach planned subgrade elevation, we recommend that the subgrade be proofrolled with a fully-loaded, single-axle dump truck or other pneumatic-tired construction equipment of similar weight. Four passes should be made, two at right angles to those preceding. The geotechnical engineer or his representative should observe proofrolling. Areas judged to perform unsatisfactorily (e.g., excessive pumping and/or rutting) by the engineer should be undercut and replaced with structural soil fill or remediated at the geotechnical engineer's recommendation. Areas to receive structural soil fill should also be proofrolled prior to the placement of any fill. Proofrolling operations shall be extended a minimum distance of 10 feet beyond the building perimeter and 5 feet beyond pavement areas.

4.2.2 Structural Soil Fill

Material considered suitable for use as structural fill should be clean soil free of organics, trash, and other deleterious material, containing no rock fragments greater than 6 inches in any one dimension. Preferably, structural soil fill material should have a standard Proctor maximum dry density of 90 pcf, or greater, and a plasticity index (PI) of 35 percent or less. All material to be used as structural fill should be tested by the geotechnical engineer to confirm that it meets the project requirements before being placed. Based on limited laboratory testing, the on-site soil appears generally suitable for use as structural soil fill.

Structural fill should be placed in loose, horizontal lifts not exceeding 8 inches in thickness. Each lift should be compacted to at least 98 percent of the soil’s maximum dry density per the standard Proctor method (ASTM D 698) and within the range of minus (-) 2 percent to plus (+) 3 percent of the optimum moisture content. Each lift should be tested by geotechnical personnel to confirm that the contractor’s method is capable of achieving the project requirements before placing any subsequent lifts. Any areas which have become soft or frozen should be removed before additional structural fill is placed.

4.2.3 Dense Graded Aggregate

Dense-graded aggregate (DGA) fill may be required as backfill, to reach finished floor elevation. The DGA used for this section should be Type A, Class A, and Grading E in accordance with Section 903.05 of the Tennessee Department of Transportation (TDOT) specifications. The DGA fill should be placed in loose, horizontal lifts not exceeding 8 inches in loose thickness. Each lift should be compacted to at least 98 percent of maximum dry density per the standard Proctor method (ASTM D 698). Each lift should be compacted, tested by geotechnical personnel and approved before placing any subsequent lifts.

4.3 FOUNDATION RECOMMENDATIONS

4.3.1 Shallow Foundations

Foundations for the proposed construction are anticipated to bear in stiff residual soils and/or properly compacted structural fill. The recommended allowable soil bearing capacity for design of the foundations is 2,500 psf or less. We recommend that continuous foundations be a minimum of 18 inches wide and isolated spread footings be a minimum of 24 inches wide to reduce the possibility of a localized punching shear failure. All exterior footings should be designed to bear at least 18 inches below finished exterior grade to protect against frost heave.

A geotechnical representative should be retained to perform foundation subgrade tests to confirm that the recommendations provided in this report are consistent with the site conditions encountered. Some undercutting of soft soils which may be found between boring locations during foundation excavations should be anticipated. A dynamic cone penetrometer (DCP) is commonly utilized to provide information that is compared to the data obtained in the geotechnical report. Where unacceptable materials are encountered, the material should be excavated to stiff, suitable soils or remediated at the geotechnical engineer's direction.

4.3.2 Slabs-on-Grade

For slab-on-grade construction, the site should be prepared as previously described. We recommend that the subgrade be topped with a minimum 4-inch layer of crushed stone to act as a capillary moisture block. The subgrade should be proofrolled and approved prior to the placement of the

crushed stone. Based on the conditions encountered on this site, we recommend that the floor slabs be designed using a subgrade modulus of 120 pounds per cubic inch (pci). This modulus is appropriate for small diameter loads (i.e. a 1ft x 1ft plate) and should be adjusted for wider loads.

4.3.3 Settlement

We have estimated the total and differential settlements for the proposed foundations expected at this site. The method is based on the Federal Highways Administration (FHWA) Empirical Settlement Analysis Procedure. This FHWA empirical method allows the use of the SPT N-values in this calculation and includes the type of soil encountered. Based on this empirical method, we anticipate total settlements of less than 1 inch and differential settlements of less than 0.75 inch. The settlement information provided was with a maximum column and continuous foundation load of 150 kips and 6 kips per linear foot as well as an allowable bearing pressure of 2,500 psf.

4.4 SEISMIC DESIGN CRITERIA

International Building Code, 2012

In accordance with the International Building Code, 2006/2009, we have provided the following table of seismic design information. After evaluating the subsurface conditions it was determined that the structure should be designed in accordance with a seismic site class D. A table follows showing the calculated spectral response accelerations for both a short and 1-second period.

Table 1: Seismic Design Parameters

Structure	S_s g	S_1 g	S_{DS} g	S_{D1} g
Proposed Senior Housing	0.520	0.118	0.480	0.183

4.5 PAVEMENT DESIGN RECOMMENDATIONS

4.5.1 Flexible Pavement Design

AASHTO flexible pavement design methods have been utilized for pavement recommendations. Our recommendations are based on the assumptions that the subgrade has been properly prepared as described previously. Based on our experience with similar developments, we recommend the following light and heavy-duty flexible pavement sections:

Table 2: Flexible Pavement Recommendations

Pavement Materials	Light-Duty (in)	Heavy-Duty (in)
Bituminous Asphalt Surface Mix	1.5	1.5
Bituminous Asphalt Base Mix	2.0	3.0
Compacted Crushed Aggregate Base	6.0	8.0

We recommend a base stone equivalent to a Type A, Class A and Grading D in accordance with Section 903.05 of the Tennessee Department of Transportation specifications. The bituminous asphalt pavement should be Grading "E" as per Section 411 for the surface mix and Grading “BM/BM2” as per section 307 for the binder mix. Compaction requirements for the crushed aggregate base and the bituminous asphalt pavement should generally follow Tennessee Department of Transportation specifications.

4.5.2 Rigid Pavement Design

AASHTO rigid pavement design methods have been utilized for pavement recommendations. In areas of trash dumpster pads or areas where large trucks will be parked on the pavement, we recommend the use of a concrete paving section. Our recommendations are based on the assumptions that the subgrade has been properly prepared. Based on our experience with similar developments, we recommend the following rigid pavement section:

Table 3: Rigid Pavement Recommendations

Pavement Materials	Light-Duty (in)	Heavy-Duty (in)
4,000 psi Type I Concrete	6.0	7.0
Compacted Crushed Aggregate Base	4.0	6.0

Concrete should be reinforced with welded wire fabric or reinforcing bars to assist in controlling cracking from drying shrinkage and thermal changes. Sawed or formed control joints should be included for each 225 square feet of area or less (15 feet by 15 feet). Saw cuts should not cut through the welded wire fabric or reinforcing steel and dowels should be utilized at formed and/or cold joints.

4.5.3 General

Our recommendations are based upon the assumption that the subgrade has been properly prepared as described previously and that any off-site soil borrows to be used to backfill to the final subgrade meets the requirements provided in this report.

All paved areas should be constructed with positive drainage to direct water off-site and to minimize surface water seeping into the pavement subgrade. The subgrade should have a minimum slope of 1 percent. In down grade areas, the basestone should extend through the slope to allow any water entering the basestone a path to exit. For rigid pavements, water-tight seals should also be provided at formed construction and expansion joints.

4.6 LATERAL EARTH PRESSURES

We are currently unaware of any below grade walls associated with the project. However, with the possibility, we are providing equivalent fluid pressures for three backfill conditions for cantilever-type walls. These are 1) active earth pressure for granular backfill (clean sand or gravel), 2) at-rest earth pressure for granular backfill, and 3) at-rest earth pressure for fine-grained (clay) backfill. The equivalent fluid pressures provided have assumed a level backfill and a wall with a vertical face.

Condition 1 - The active earth pressure for granular backfill will result in an equivalent fluid pressure of 30 pounds per cubic foot (pcf). If the granular backfill is to develop active earth pressure conditions, walls must be flexible and/or free to rotate or translate at the top approximately one inch laterally for every 20 feet of wall height.

Condition 2 - The at-rest earth pressure for granular backfill will result in an equivalent fluid pressure of 47 pcf. For retaining walls that will not rotate or translate, such as building walls or other walls rigidly connected to structures, at-rest conditions will develop.

Condition 3 - Walls backfilled with fine-grained material (silt or clay) should be designed using the at-rest earth pressure whether restrained at the top, or not. Fine-grained soils typically creep over time which produces additional lateral stresses to the wall. The equivalent fluid pressure for this case is 70 pcf

In all cases, forces from any expected surcharge loading including sloping backfill should be added to the equivalent fluid pressures. The walls should be properly drained to remove water or hydrostatic pressure should be added to the design pressure. Also, all backfill for the walls should be placed in accordance with the structural fill recommendations described hereinafter.

For rigid, cast-in-place concrete walls, an ultimate friction factor of 0.35 between foundation concrete and the bearing soils may be used when evaluating friction. Also, an ultimate passive earth pressure resistance of well-compacted soil fill can be approximated by a uniformly acting resistance of 300 psf. However, to limit deformation when relying on passive strength, we recommend using a minimum safety factor of 3.0 applied to the ultimate passive resistance value.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 FOUNDATION CONSTRUCTION

Foundation excavations should be opened, the subgrade evaluated, remedial work performed (if required), and concrete placed in an expeditious manner. Exposure to weather often reduces foundation support capabilities, thus necessitating remedial measures prior to concrete placement. It is also important that proper surface drainage be maintained both during construction (especially in terms of maintaining dry footing trenches) and after construction. Soil backfill for footings should be placed in accordance with the recommendations for structural fill presented herein.

5.2 EXCAVATIONS

As previously mentioned, auger refusal materials were not encountered in any of the borings performed at the site. Auger refusal conditions generally correspond to materials which require difficult excavation techniques for removal. Typically, soils penetrated by augers can be removed with conventional earthmoving equipment. However, excavation equipment varies, and field refusal conditions may vary. Generally, the weathering process is erratic and variations in the rock profile can occur in small lateral distances, particularly in this type of geology. Based on subsurface conditions encountered difficult excavation techniques will likely not be required across the site during grading. However, as mentioned, pinnacles of bedrock (if encountered) will require special removal equipment (pneumatic splitters, hydraulic hammer, etc.) for excavation.

5.2.1 Excavation Safety

Excavations should be sloped or shored in accordance with local, state, and federal regulations, including OSHA (29 CFR Part 1926) excavation trench safety standards. The contractor is usually solely responsible for site safety. This information is provided only as a service, and under no circumstances should GEOServices be assumed responsible for construction site safety.

5.3 HIGH PLASTICITY SOIL CONSIDERATIONS

Based on our experience in the East Tennessee area, soils with plasticity indices (PI) less than 30 percent have a slight potential for volume changes with changes in moisture content, and soils with a PI greater than 50 percent are highly susceptible to volume changes. Between these values, we consider the soils to be moderately susceptible to volume changes. The laboratory test results indicate that the soils at this site are moderately susceptible with PI values of 37 and 38 percent.

Highly plastic soils have the potential to shrink or swell with significant changes in moisture content. Unlike other areas of the country where high plasticity soils cause considerable foundation problems, East Tennessee does not typically endure long periods of severe drought or wet weather. However, in recent years drought conditions have been sufficient to cause soil shrinkage and related structural distress of buildings, floor slabs and pavements at sites underlain by high plasticity soils.

At sites that have high plasticity soils, certain precautions should be considered to minimize or eliminate the potential for volume changes. The most effective way to eliminate the potential for volume changes is to remove highly plastic soils and replace them with compacted fill of non-expansive material. Testing and recommendations for the required depth of removal can be provided, if needed. If removal of the highly plastic soils is not desirable, then measures should be taken to protect the soils from excessive amounts of wetting or drying. In addition, modification of the soils by lime or cement treatment can be utilized to reduce the soil plasticity.

Several construction considerations may reduce the potential for volume changes in the subgrade soils. Foundations should be excavated, checked, and concreted in the same day to prevent excessive wetting or drying of the foundation soils. The floor subgrade should be protected from excessive drying and wetting by covering the subgrade prior to slab construction. The site should be graded in order to drain surface water away from the building both during and after construction. Installing moisture barriers around the perimeter of the slab will help limit the moisture variation of the soil and reduce the potential for shrinking or swelling. In addition, roof drains should discharge water away from the building area and foundations. Heat sources should

be isolated from foundation soils to minimize drying of the foundation soils. Trees and large shrubs can draw large amounts of moisture from the soil during dry weather and should be kept well away from the building to prevent excessive drying of the foundation soils. Watering of lawns or landscaped areas should be performed to maintain moisture levels during dry weather.

Structural details to make the building flexible should be considered to accommodate potential volume changes in the subgrade. Floor slabs should be liberally jointed to control cracking, and the floor slab should not be structurally connected to the walls. Walls should incorporate sufficient expansion/contraction joints to allow for differential movement.

5.4 MOISTURE SENSITIVE SOILS

The moderately plastic fine-grained soils encountered at this site will be sensitive to disturbances caused by construction traffic and changes in moisture content. During wet weather periods, increases in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. Construction traffic patterns should be varied to prevent the degradation of previously stable subgrade. In addition, the soils at this site which become wet may be slow to dry and thus significantly retard the progress of grading and compaction activities. We caution if site grading is performed during the wet weather season increases in the undercut volume required due to the marginal fills should be expected. Further for site fills, methods such as discing and allowing the material to dry will be required to meet the required compaction recommendations. It will, therefore, be advantageous to perform earthwork and foundation construction activities during dry weather. However, November through March is typically the difficult grading period due to the limited drying conditions that exist.

5.5 DRAINAGE AND SURFACE WATER CONCERNS

To reduce the potential for additional undercut and construction induced sinkholes, water should not be allowed to collect in the foundation excavations, on floor slab areas, or on prepared subgrades of the construction area either during or after construction. Undercut or excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater, subsurface

water, or surface runoff. Positive site surface drainage should be provided to reduce infiltration of surface water around the perimeter of the building and beneath the floor slab. The grades should be sloped away from the building and surface drainage should be collected and discharged such that water is not permitted to infiltrate the backfill and floor slab areas of the building.

5.6 SINKHOLE RISK REDUCTION AND CORRECTIVE ACTIONS

Based on our experience, corrective actions can also be performed to reduce the potential for sinkhole development at this site. These corrective actions would decrease but not eliminate the potential for sinkhole development. Much can be accomplished to decrease the potential of future sinkhole activity by proper grade selection and positive site drainage.

In general, the portions of a site that are excavated to achieve the desired grades will have a higher risk of sinkhole development than the areas that are filled, because of the exposure of relic fractures in the soil to rainfall and runoff. On the other hand, those portions of a site that receive a modest amount of fill (or that have been filled in the past) will have a decreased risk of sinkhole development caused by rainfall or runoff because the placement of a cohesive soil fill over these areas effectively caps the area with a relatively impervious "blanket" of remolded soil. Therefore, the recommendations that follow incorporate a modest remedial treatment program designed to make the surface of the soil in excavated areas less permeable.

Although it is our opinion that the risk of ground subsidence associated with sinkhole formation cannot be eliminated, we have found that several measures are useful in site design and development to reduce this potential risk. These measures include:

- Maintaining positive site drainage to route surface waters well away from structural areas both during construction and for the life of the structure.
- The scarification and re-compaction of the upper 6 to 10 inches of soil in earthwork cut areas.
- Verifying that subsurface piping beneath structures is carefully constructed and pressure tested prior to its placement in service.
- The use of pavement or lined ditches, particularly in cut areas, to collect and transport surface water to areas away from structures.

Considerations when building within a sinkhole prone area are to provide positive surface drainage away from any proposed building or parking area both during and after construction. Backfill in utility trenches of other excavations should consist of compacted, well-graded material such as dense graded aggregate or compacted on site soils. The use of an open graded stone such as No. 57 stone is not recommended unless the stone backfill is provided an exit path and not allowed to pond. If sinkhole conditions are observed, the type of corrective action is most appropriately determined by GEOServices on a case-by-case basis.

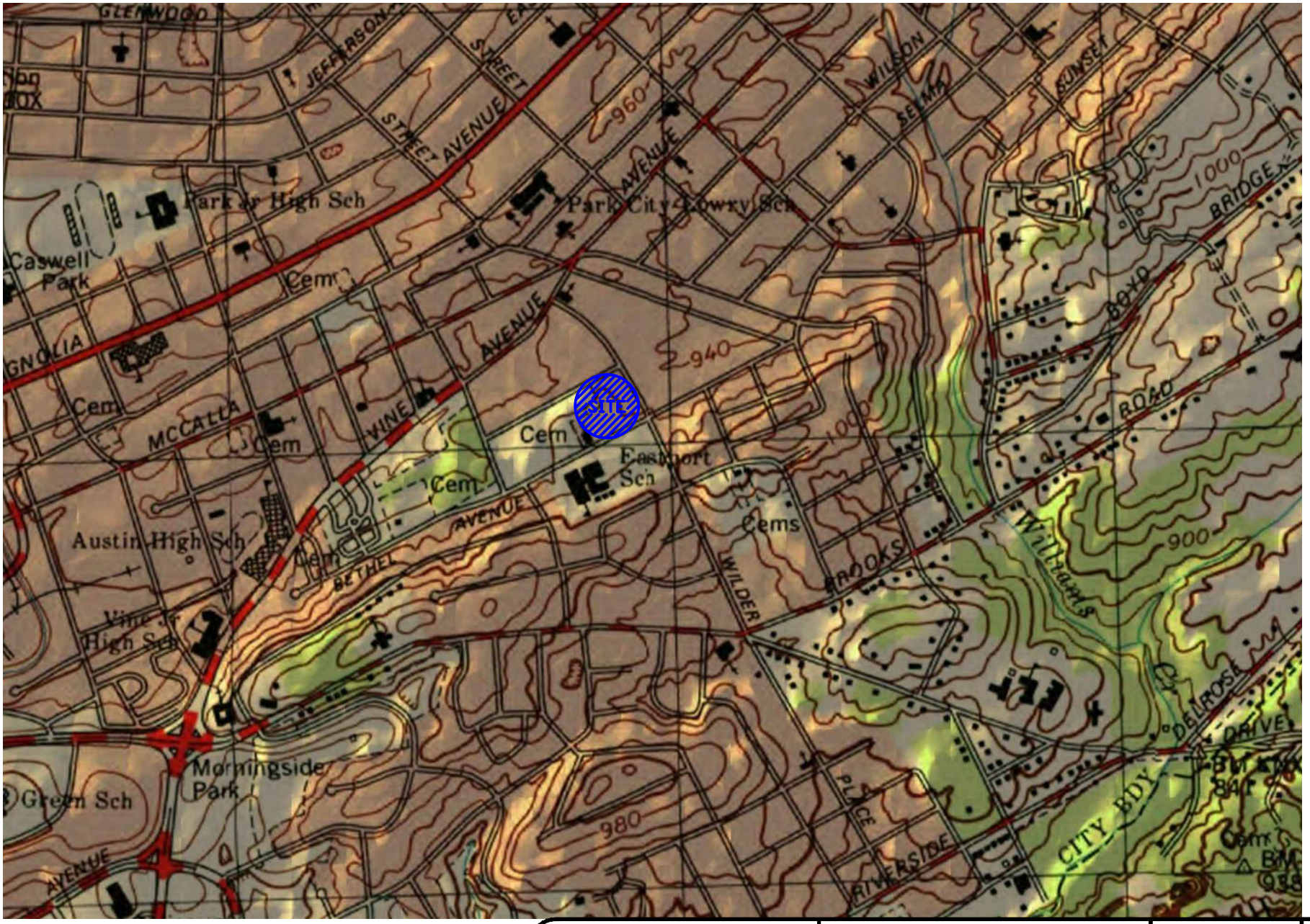
6.0 LIMITATIONS

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. This report is for our geotechnical work only, and no environmental assessment efforts have been performed. The conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report was prepared. No other warranty, express or implied, is made.

The analyses and recommendations submitted herein are based, in part, upon the data obtained from the exploration. The nature and extent of variations between the borings will not become evident until construction. We recommend that GEOServices be retained to observe the project construction in the field. GEOServices cannot accept responsibility for conditions which deviate from those described in this report if not retained to perform construction observation and testing. If variations appear evident, then we will re-evaluate the recommendations of this report. In the event that any changes in the nature, design, or location of the structures are planned, the conclusions and recommendations contained in this report will not be considered valid unless the changes are reviewed and conclusions modified or verified in writing. Also, if the scope of the project should change significantly from that described herein, these recommendations may need to be re-evaluated.

APPENDIX A

Figures and Test Boring Records



NOTES:

1.) BASE MAP: USGS QUADRANGLE (KNOXVILLE, TENNESSEE)

GEOS
GEOServices, LLC-Geotechnical and Materials Engineers
2561 Willow Point Way
Knoxville, Tennessee 37931
Office: 865-539-8242
Fax: 865-539-8252

SITE VICINITY MAP

KCDC SENIOR HOUSING

BETHEL AVENUE

KNOXVILLE, TN

DRAWN BY:	MRB
APPROVED BY:	ACA
SCALE:	N.T.S.
JOB NO.:	21-15445
DATE:	8-6-2015

FIGURE

1

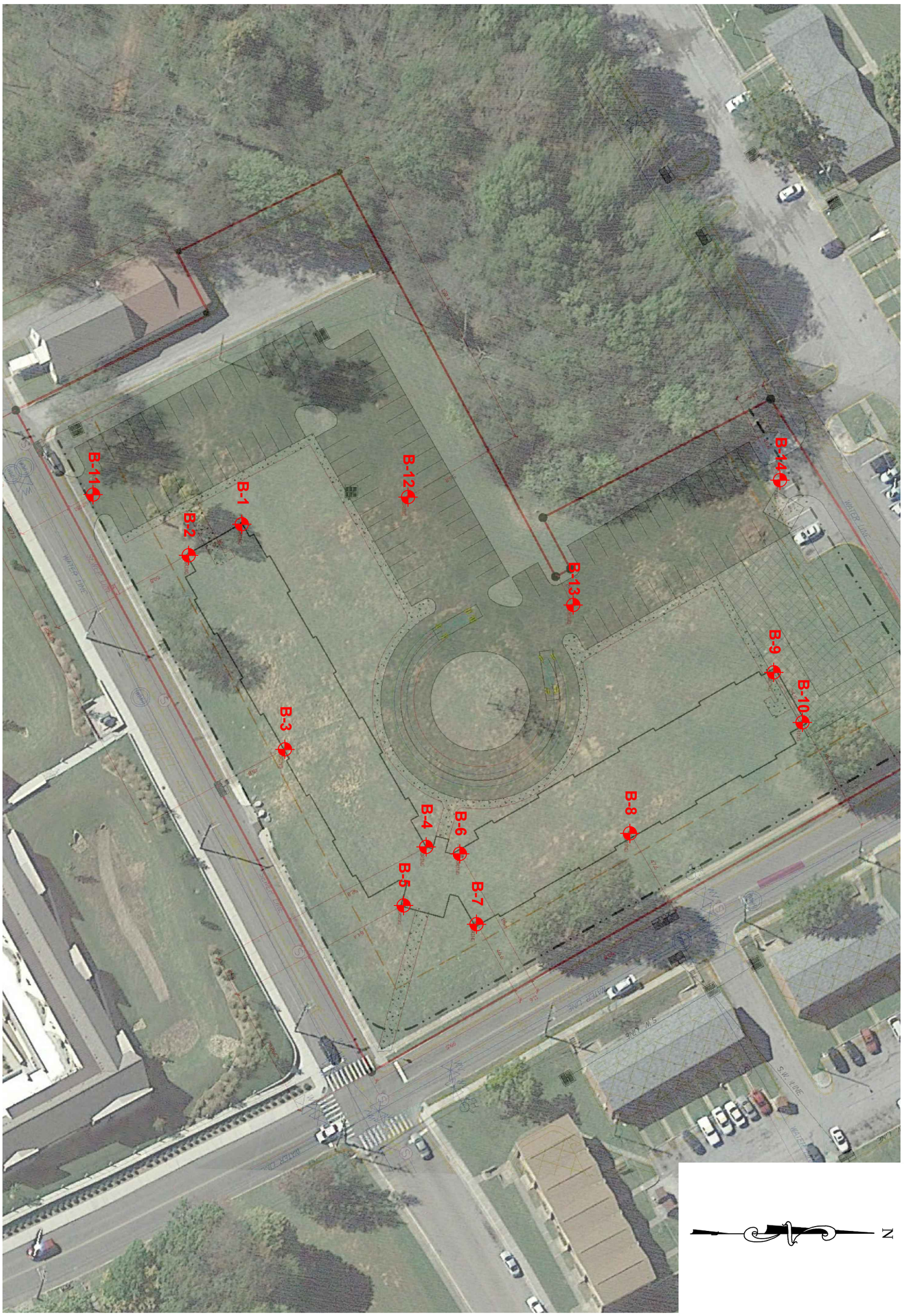


FIGURE 2

GEOS Services, LLC-Geotechnical and Materials Engineers
2561 Willow Point Way
Knoxville, Tennessee 37931
Office: 865-539-8242
Fax: 865-539-8252

DRAWN BY:	MRB
APPROVED BY:	ACA
SCALE:	N.T.S.
JOB NO.:	21-15445
DATE:	8-6-2015

BORING LOCATION PLAN

KCDC SENIOR HOUSING

BETHEL AVENUE

KNOXVILLE, TENNESSEE

NOTES:

1.) BORING LOCATIONS ARE SHOWN IN GENERAL ARRANGMENT ONLY.
2.) DO NOT USE BORING LOCATIONS FOR DETERMINATIONS OF DISTANCES OR QUANTITIES.
3.) BASE MAP PROVIDED BY: Partners Development.

LOCATION OF SOIL TEST BORING

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-1
SHEET 1 OF 2

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-1 DRY ON COMPLETION ? Yes

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 25.0 FT. 7.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 25.0 FT. ELEV. -25.0 FT.

BORING ADVANCED BY: POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH Dry FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											Topsoil (3 Inches)
		1.0	2.5	1	SS	8					
2.5	-2.5										Fat CLAY (CH) - orangish brown and light brown - moist - firm to stiff (RESIDUUM)
		3.5	5.0	2	SS	14					
5.0	-5.0										
		6.0	7.5	3	SS	10					
7.5	-7.5										
		8.5	10.0	4	SS	13					
10.0	-10.0										
12.5	-12.5										Fat CLAY (CH) - with shale fragments and abundant shale like structure - orangish brown and light brown with oxide staining - moist - stiff (RESIDUUM)
		13.5	15.0	5	SS	9					
15.0	-15.0										
17.5	-17.5										
		18.5	20.0	6	SS	9					
20.0	-20.0										

Continued

REMARKS:

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-1
SHEET 2 OF 2

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-1 DRY ON COMPLETION ? Yes

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 25.0 FT. 7.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 25.0 FT. ELEV. -25.0 FT.

BORING ADVANCED BY: . POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH Dry FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											(continued)
22.5	-22.5										Fat CLAY (CH) - with shale fragments and abundant shale like structure - orangish brown and light brown with oxide staining - moist - stiff (RESIDUUM)
		23.5	25.0	7	SS	12					
25.0	-25.0										Boring Terminated at 25.0 Feet
27.5	-27.5										
30.0	-30.0										
32.5	-32.5										
35.0	-35.0										
37.5	-37.5										
40.0	-40.0										

REMARKS:

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-2
SHEET 1 OF 2

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-2 DRY ON COMPLETION ? Yes

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 25.0 FT. 7.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 25.0 FT. ELEV. -25.0 FT.

BORING ADVANCED BY: POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH Dry FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											Topsoil (4 Inches)
		1.0	2.5	1	SS	9					
2.5	-2.5										Lean CLAY (CH) - with rock fragments and oxide nodules - brown and orangish brown - moist (FILL)
		3.5	5.0	2	SS	7					
5.0	-5.0										
		6.0	7.5	3	SS	14					
7.5	-7.5										
		8.5	10.0	4	SS	9					
10.0	-10.0										Fat CLAY (CH) - with shale fragments, shale like structure and oxdide nodules - orangish brown and light brown with oxide staining - moist - stiff (RESIDUUM)
12.5	-12.5										
		13.5	15.0	5	SS	9					
15.0	-15.0										
17.5	-17.5										Fat CLAY (CH) - with shale fragments and oxdide nodules - reddish brown and light brown with oxide staining - moist to wet - firm to stiff (RESIDUUM) (Moisture increases with depth)
		18.5	20.0	6	SS	6					
20.0	-20.0										

Continued

REMARKS:

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-2
SHEET 2 OF 2

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-2 DRY ON COMPLETION ? Yes

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 25.0 FT. 7.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 25.0 FT. ELEV. -25.0 FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH Dry FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

BORING ADVANCED BY: POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											(continued)
22.5	-22.5										Fat CLAY (CH) - with shale fragments and oxdide nodules - reddish brown and light brown with oxide staining - moist to wet - firm to stiff (RESIDUUM) (Moisture increases with depth)
		23.5	25.0	7	SS	10					
25.0	-25.0										Boring Terminated at 25.0 Feet
27.5	-27.5										
30.0	-30.0										
32.5	-32.5										
35.0	-35.0										
37.5	-37.5										
40.0	-40.0										

REMARKS:

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-3
SHEET 1 OF 2

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-3 DRY ON COMPLETION ? Yes

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 25.0 FT. 7.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 25.0 FT. ELEV. -25.0 FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH Dry FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

BORING ADVANCED BY: POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											Topsoil (4 Inches)
		1.0	2.5	1	SS	15					
2.5	-2.5										Fat CLAY (CH) - with rock fragments, trace sand and oxide nodules - brown and orangish brown - moist (FILL)
		3.5	5.0	2	SS	8					
5.0	-5.0										
		6.0	7.5	3	SS	14		65	37	25.8	
7.5	-7.5										
		8.5	10.0	4	SS	11					
10.0	-10.0										
											Fat CLAY (CH) - with shale fragments, shale like structure and oxdide nodules - orangish brown and light brown with oxide staining - moist - stiff (RESIDUUM)
12.5	-12.5										
		13.5	15.0	5	SS	9					
15.0	-15.0										
17.5	-17.5										
		18.5	20.0	6	SS	9					
20.0	-20.0										

Continued

REMARKS:

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-3
SHEET 2 OF 2

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-3 DRY ON COMPLETION ? Yes

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 25.0 FT. 7.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 25.0 FT. ELEV. -25.0 FT.

BORING ADVANCED BY: . POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH Dry FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											(continued)
22.5	-22.5										Fat CLAY (CH) - with shale fragments, shale like structure and oxdide nodules - orangish brown and light brown with oxide staining - moist - stiff (RESIDUUM)
		23.5	25.0	7	SS	14					
25.0	-25.0										Boring Terminated at 25.0 Feet
27.5	-27.5										
30.0	-30.0										
32.5	-32.5										
35.0	-35.0										
37.5	-37.5										
40.0	-40.0										

REMARKS:

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-4
SHEET 1 OF 2

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-4 DRY ON COMPLETION ? Yes

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 25.0 FT. 7.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 25.0 FT. ELEV. -25.0 FT.

BORING ADVANCED BY: . POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH Dry FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											Topsoil (4 Inches)
		1.0	2.5	1	SS	5					
2.5	-2.5										
		3.5	5.0	2	SS	14					Fat CLAY (CH) - orangish brown and light brown - moist - firm to stiff (RESIDUUM)
5.0	-5.0										
		6.0	7.5	3	SS	15					
7.5	-7.5										
		8.5	10.0	4	SS	14					
10.0	-10.0										
12.5	-12.5										
		13.5	15.0	5	SS	8					Fat CLAY (CH) - with shale fragments and shale like structure - orangish brown and brown with oxide staining - moist to wet - firm to stiff (RESIDUUM) (Moisture increases with depth)
15.0	-15.0										
17.5	-17.5										
		18.5	20.0	6	SS	9					
20.0	-20.0										

Continued

REMARKS:

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-4
SHEET 2 OF 2

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-4 DRY ON COMPLETION ? Yes

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 25.0 FT. 7.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 25.0 FT. ELEV. -25.0 FT.

BORING ADVANCED BY: . POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH Dry FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											(continued)
22.5	-22.5										Fat CLAY (CH) - with shale fragments and shale like structure - orangish brown and brown with oxide staining - moist to wet - firm to stiff (RESIDUUM) (Moisture increases with depth)
		23.5	25.0	7	SS	10					
25.0	-25.0										Boring Terminated at 25.0 Feet
27.5	-27.5										
30.0	-30.0										
32.5	-32.5										
35.0	-35.0										
37.5	-37.5										
40.0	-40.0										

REMARKS:

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-5
SHEET 1 OF 2

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-5 DRY ON COMPLETION ? Yes

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 25.0 FT. 7.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 25.0 FT. ELEV. -25.0 FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH Dry FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

BORING ADVANCED BY: POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											Topsoil (5 Inches)
		1.0	2.5	1	SS	8					
2.5	-2.5										
		3.5	5.0	2	SS	11					Fat CLAY (CH) - with shale fragments, trace sand, trace root structure and oxide nodules - orangish brown and light brown with oxide staining - moist - firm to stiff (RESIDUUM)
5.0	-5.0										
		6.0	7.5	3	SS	7					
7.5	-7.5										
		8.5	10.0	4	SS	11					
10.0	-10.0										
12.5	-12.5										
		13.5	15.0	5	SS	18					Fat CLAY (CH) - with shale fragments, shale like structure and oxide nodules - orangish brown and light brown with oxide staining - moist to wet - stiff to very stiff (RESIDUUM) (Moisture increases with depth)
15.0	-15.0										
17.5	-17.5										
		18.5	20.0	6	SS	14					
20.0	-20.0										

Continued

REMARKS:

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-5
SHEET 2 OF 2

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-5 DRY ON COMPLETION ? Yes

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 25.0 FT. 7.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 25.0 FT. ELEV. -25.0 FT.

BORING ADVANCED BY: . POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH Dry FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											(continued)
22.5	-22.5										Fat CLAY (CH) - with shale fragments, shale like structure and oxide nodules - orangish brown and light brown with oxide staining - moist to wet - stiff to very stiff (RESIDUUM) (Moisture increases with depth)
		23.5	25.0	7	SS	16					
25.0	-25.0										Boring Terminated at 25.0 Feet
27.5	-27.5										
30.0	-30.0										
32.5	-32.5										
35.0	-35.0										
37.5	-37.5										
40.0	-40.0										

REMARKS:

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-6
SHEET 1 OF 2

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-6 DRY ON COMPLETION ? No

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 25.0 FT. 7.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 25.0 FT. ELEV. -25.0 FT.

BORING ADVANCED BY: . POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH 5.8 FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											Topsoil (4 Inches)
		1.0	2.5	1	SS	12					Fat CLAY (CH) - with rock fragments, trace sand and trace organics - orangish brown and light brown - moist (FILL)
2.5	-2.5										
		3.5	5.0	2	SS	10					
5.0	-5.0										
		6.0	7.5	3	SS	16					
7.5	-7.5										
		8.5	10.0	4	SS	14					
10.0	-10.0										
											Fat CLAY (CH) - with shale fragments and shale like structure - orangish brown with oxide staining - moist - soft to very stiff (RESIDUUM)
12.5	-12.5										
		13.5	15.0	5	SS	18					
15.0	-15.0										
17.5	-17.5										
		18.5	20.0	6	SS	4					
20.0	-20.0										

Continued

REMARKS:

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-6
SHEET 2 OF 2

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-6 DRY ON COMPLETION ? No

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 25.0 FT. 7.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 25.0 FT. ELEV. -25.0 FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH 5.8 FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

BORING ADVANCED BY: . POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											(continued)
22.5	-22.5										Fat CLAY (CH) - with shale fragments and shale like structure - orangish brown with oxide staining - moist - soft to very stiff (RESIDUUM)
		23.5	25.0	7	SS	17					
25.0	-25.0										Boring Terminated at 25.0 Feet
27.5	-27.5										
30.0	-30.0										
32.5	-32.5										
35.0	-35.0										
37.5	-37.5										
40.0	-40.0										

REMARKS:

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-7
SHEET 1 OF 2

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-7 DRY ON COMPLETION ? Yes

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 25.0 FT. 7.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 25.0 FT. ELEV. -25.0 FT.

BORING ADVANCED BY: POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH Dry FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											Topsoil (4 Inches)
		1.0	2.5	1	SS	8				20.1	Fat CLAY (CH) - with rock fragments, trace organics and oxide nodules - orangish brown and dark brown - moist (FILL)
2.5	-2.5										
		3.5	5.0	2	SS	11				21.5	
5.0	-5.0										
		6.0	7.5	3	SS	8				30.2	
7.5	-7.5										
		8.5	10.0	4	SS	16				29.3	Fat CLAY (CH) - with shale fragments, shale like structure and oxide nodules - orangish brown and light brown with oxide staining - moist - firm to very stiff (RESIDUUM)
10.0	-10.0										
12.5	-12.5										
		13.5	15.0	5	SS	8				30.9	
15.0	-15.0										
17.5	-17.5										Fat CLAY (CH) - with shale fragments and shale like structure - brown - wet - stiff to very stiff (RESIDUUM)
		18.5	20.0	6	SS	12				27.7	
20.0	-20.0										

Continued

REMARKS:

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-7
SHEET 2 OF 2

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-7 DRY ON COMPLETION ? Yes

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 25.0 FT. 7.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 25.0 FT. ELEV. -25.0 FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH Dry FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

BORING ADVANCED BY: POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											(continued)
22.5	-22.5										Fat CLAY (CH) - with shale fragments and shale like structure - brown - wet - stiff to very stiff (RESIDUUM)
		23.5	25.0	7	SS	9				32.1	
25.0	-25.0										Boring Terminated at 25.0 Feet
27.5	-27.5										
30.0	-30.0										
32.5	-32.5										
35.0	-35.0										
37.5	-37.5										
40.0	-40.0										

REMARKS:

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-8
SHEET 1 OF 2

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-8 DRY ON COMPLETION ? Yes

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 25.0 FT. 7.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 25.0 FT. ELEV. -25.0 FT.

BORING ADVANCED BY: POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH Dry FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											Topsoil (4 Inches)
		1.0	2.5	1	SS	12					
2.5	-2.5										
		3.5	5.0	2	SS	14					Fat CLAY (CH) - with shale fragments and shale like structure - orangish brown and light brown - moist - stiff (RESIDUUM)
5.0	-5.0										
		6.0	7.5	3	SS	13					
7.5	-7.5										
		8.5	10.0	4	SS	13		70	38	42.0	
10.0	-10.0										Fat CLAY (CH) - with shale fragments - orangish brown and brown with oxide staining - moist - stiff (RESIDUUM)
12.5	-12.5										
		13.5	15.0	5	SS	10					
15.0	-15.0										
17.5	-17.5										Fat CLAY (CH) - with shale fragments and abundant shale like structure - Orangish brown, light brown and brown - moist to wet - very stiff (RESIDUUM) (Moisture increases with depth)
		18.5	20.0	6	SS	21					
20.0	-20.0										

Continued

REMARKS:

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-8
SHEET 2 OF 2

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-8 DRY ON COMPLETION ? Yes

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 25.0 FT. 7.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 25.0 FT. ELEV. -25.0 FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH Dry FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

BORING ADVANCED BY: . POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											(continued)
22.5	-22.5										Fat CLAY (CH) - with shale fragments and abundant shale like structure - Orangish brown, light brown and brown - moist to wet - very stiff (RESIDUUM) (Moisture increases with depth)
		23.5	25.0	7	SS	16					
25.0	-25.0										Boring Terminated at 25.0 Feet
27.5	-27.5										
30.0	-30.0										
32.5	-32.5										
35.0	-35.0										
37.5	-37.5										
40.0	-40.0										

REMARKS:

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-9
SHEET 1 OF 2

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-9 DRY ON COMPLETION ? Yes

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 25.0 FT. 7.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 25.0 FT. ELEV. -25.0 FT.

BORING ADVANCED BY: POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH Dry FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											Topsoil (3 Inches)
		1.0	2.5	1	SS	9					
2.5	-2.5										
		3.5	5.0	2	SS	11					
5.0	-5.0										
		6.0	7.5	3	SS	15					
7.5	-7.5										
		8.5	10.0	4	SS	17					
10.0	-10.0										Fat CLAY (CH) - with shale fragments and shale like structure - light brown and brown with oxide staining - moist - stiff to very stiff (RESIDUUM)
12.5	-12.5										
		13.5	15.0	5	SS	23					
15.0	-15.0										
17.5	-17.5										
		18.5	20.0	6	SS	21					
20.0	-20.0										

Continued

REMARKS:

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-9
SHEET 2 OF 2

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-9 DRY ON COMPLETION ? Yes

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 25.0 FT. 7.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 25.0 FT. ELEV. -25.0 FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH Dry FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

BORING ADVANCED BY: . POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											(continued)
22.5	-22.5										Fat CLAY (CH) - with shale fragments and shale like structure - light brown and brown with oxide staining - moist - stiff to very stiff (RESIDUUM)
		23.5	24.3	7	SS	50/3"					Weathered Shale - brown - dry
25.0	-25.0										Boring Terminated at 25.0 Feet
27.5	-27.5										
30.0	-30.0										
32.5	-32.5										
35.0	-35.0										
37.5	-37.5										
40.0	-40.0										

REMARKS:

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-10
SHEET 1 OF 2

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-10 DRY ON COMPLETION ? Yes

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 25.0 FT. 7.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 25.0 FT. ELEV. -25.0 FT.

BORING ADVANCED BY: POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH Dry FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											Topsoil (4 Inches)
		1.0	2.5	1	SS	8					Fat CLAY (CH) - with rock fragments, trace organics and oxide nodules - reddish brown and brown with oxide staining - moist (FILL)
2.5	-2.5										
		3.5	5.0	2	SS	12					
5.0	-5.0										
		6.0	7.5	3	SS	14					
7.5	-7.5										
		8.5	10.0	4	SS	24					
10.0	-10.0										
											Fat CLAY (CH) - with shale fragments and shale like structure - orangish brown and light brown with oxide staining - moist - firm to very stiff (RESIDUUM)
12.5	-12.5										
		13.5	15.0	5	SS	7					
15.0	-15.0										
17.5	-17.5										
		18.5	20.0	6	SS	17					
20.0	-20.0										

Continued

REMARKS:

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-10
SHEET 2 OF 2

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-10 DRY ON COMPLETION ? Yes

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 25.0 FT. 7.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 25.0 FT. ELEV. -25.0 FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH Dry FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

BORING ADVANCED BY: . POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											(continued)
22.5	-22.5										Fat CLAY (CH) - with shale fragments and shale like structure - orangish brown and light brown with oxide staining - moist - firm to very stiff (RESIDUUM)
		23.5	24.3	7	SS	50/4"					Weathered Shale - brown - dry
25.0	-25.0										Boring Terminated at 25.0 Feet
27.5	-27.5										
30.0	-30.0										
32.5	-32.5										
35.0	-35.0										
37.5	-37.5										
40.0	-40.0										

REMARKS:

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-11
SHEET 1 OF 1

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-11 DRY ON COMPLETION ? Yes

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 15.0 FT. 4.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 15.0 FT. ELEV. -15.0 FT.

BORING ADVANCED BY: . POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH Dry FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											Topsoil (4 Inches)
		1.0	2.5	1	SS	7					
2.5	-2.5										
		3.5	5.0	2	SS	19					
5.0	-5.0										
		6.0	7.5	3	SS	14					Fat CLAY (CH) - with shale fragments, shale like structure and oxide nodules - orangish brown and light brown with oxide staining - moist - firm to very stiff (RESIDUUM)
7.5	-7.5										
		8.5	10.0	4	SS	12					
10.0	-10.0										
12.5	-12.5										
		13.5	15.0	5	SS	11					
15.0	-15.0										Boring Terminated at 15.0 Feet
17.5	-17.5										
20.0	-20.0										

REMARKS:

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-12
SHEET 1 OF 1

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-12 DRY ON COMPLETION ? Yes

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 15.0 FT. 4.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 15.0 FT. ELEV. -15.0 FT.

BORING ADVANCED BY: POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH Dry FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											Topsoil (5 Inches)
		1.0	2.5	1	SS	8					Fat CLAY (CH) - with trace organics and oxide nodules - reddish brown with oxide staining - moist (FILL)
2.5	-2.5										
		3.5	5.0	2	SS	7					Fat CLAY (CH) - with trace organics - orangish brown and gray with oxide staining - moist (RESIDUUM)
5.0	-5.0										
		6.0	7.5	3	SS	14					
7.5	-7.5										
		8.5	10.0	4	SS	15					
10.0	-10.0										Fat CLAY (CH) - with shale fragments and shale like structure - reddish brown and light brown with oxide staining - moist - stiff (RESIDUUM)
12.5	-12.5										
		13.5	15.0	5	SS	12					
15.0	-15.0										Boring Terminated at 15.0 Feet
17.5	-17.5										
20.0	-20.0										

REMARKS:

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-13
SHEET 1 OF 1

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-13 DRY ON COMPLETION ? Yes

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 15.0 FT. 4.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 15.0 FT. ELEV. -15.0 FT.

BORING ADVANCED BY: . POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH Dry FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											Topsoil (4 Inches)
		1.0	2.5	1	SS	16					
2.5	-2.5										
		3.5	5.0	2	SS	26					
5.0	-5.0										
		6.0	7.5	3	SS	12					
7.5	-7.5										Fat CLAY (CH) - with shale fragments and shale like structure - orangish brown and light brown - moist - stiff to very stiff (RESIDUUM)
		8.5	10.0	4	SS	14					
10.0	-10.0										
12.5	-12.5										
		13.5	15.0	5	SS	14					
15.0	-15.0										Boring Terminated at 15.0 Feet
17.5	-17.5										
20.0	-20.0										

REMARKS:

GEOServices, LLC-Geotechnical and Materials Engineers

KCDC Senior Housing Facility
Knoxville, Tennessee
GEOServices Project # 21-15445

LOG OF BORING B-14
SHEET 1 OF 1

DRILLER Michael Bowens
ON-SITE REP.

BORING NO. / LOCATION B-14 DRY ON COMPLETION ? Yes

DATE July 24, 2015 SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED 15.0 FT. 4.6 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 15.0 FT. ELEV. -15.0 FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH Dry FT.
ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT.
ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT.
ELEV. FT.

BORING ADVANCED BY: . POWER AUGERING X PROPOSED FINISHED FLOOR ELEVATION: FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											Asphalt (3 Inches) Basestone (6 Inches)
		1.0	2.5	1	SS	15					
2.5	-2.5										
		3.5	5.0	2	SS	15					
5.0	-5.0										
		6.0	7.5	3	SS	25					
7.5	-7.5										Fat CLAY (CH) - with shale fragments and shale like structure - orangish brown and light brown - moist - stiff to very stiff (RESIDUUM)
		8.5	10.0	4	SS	22					
10.0	-10.0										
12.5	-12.5										
		13.5	15.0	5	SS	16					
15.0	-15.0										Boring Terminated at 15.0 Feet
17.5	-17.5										
20.0	-20.0										

REMARKS:

APPENDIX B

Soil Laboratory Data

SOIL DATA SUMMARY
KCDC Senior Housing - Bethel Avenue
GEOServices Project No. 21-15445
August 4, 2015

Boring Number	Sample Number	Depth (feet)	Natural Moisture Content	Atterberg Limits			Soil Type
				LL	PL	PI	
B-3	3	6.0-7.5'	25.8%	65	28	37	CH
B-7	1	1.0-2.5'	20.1%				
	2	3.5-5.0'	21.5%				
	3	6.0-7.5'	30.2%				
	4	8.5-10.0'	29.3%				
	5	13.5-15.0'	30.9%				
	6	18.5-20.0'	27.7%				
	7	23.5-25.0'	32.1%				
B-8	4	8.5-10.0'	42.0%	70	36	38	CH

SECTION 03 05 05 - UNDERSLAB VAPOR BARRIER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sheet vapor barrier under concrete slabs on grade.

1.02 RELATED REQUIREMENTS

A. Section 03 10 00 - Concrete Forming and Accessories: Forms and accessories for formwork.

B. Section 03 20 00 - Concrete Reinforcing.

C. Section 03 30 00 - Cast-in-Place Concrete: Preparation of subgrade, granular fill, placement of concrete.

1.03 REFERENCE STANDARDS

A. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2011.

B. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturers' data on manufactured products.

C. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction.

PART 2 PRODUCTS

2.01 MATERIALS

A. Underslab Vapor Barrier:
   1. Water Vapor Permeance: Not more than 0.010 perms (0.6 ng/(s m2 Pa)), maximum.
   2. Thickness: 15 mils (0.4 mm).
   3. Basis of Design:
      a. Stego Industries LLC; Stego Wrap Vapor Barrier (15-mil): www.stegoindustries.com.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

B. Accessory Products: Vapor barrier manufacturer's recommended tape, adhesive, mastic, etc., for sealing seams and penetrations in vapor barrier.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surface over which vapor barrier is to be installed is complete and ready before proceeding with installation of vapor barrier.

3.02 INSTALLATION

A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E1643.

B. Install vapor barrier under interior slabs on grade; lap sheet over footings and seal to foundation walls.

C. Lap joints minimum 6 inches (150 mm).

D. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.

E. No penetration of vapor barrier is allowed except for reinforcing steel and permanent utilities.

F. Repair damaged vapor retarder before covering with other materials.

END OF SECTION

SECTION 03 10 00

CONCRETE FORMING

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Section 032000 - Concrete Reinforcing.

B. Section 033000 - Cast-in-Place Concrete.

1.2 WORK INSTALLED BUT FURNISHED BY OTHERS

A. Build in anchors, inserts, bolts, hangers, sleeves, ferrules, waterstops and other accessories.

1.3 DESIGN REQUIREMENTS

A. Design, construct and erect formwork per ACI 347R-88, Guide to Formwork for Concrete.

1.4 ALLOWABLE TOLERANCES

A. In accordance with ACI 301-89 as listed in Table 4.3.1-Tolerances for Formed Surfaces.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concealed concrete: No. 2 Common Southern Pine, S4S, or better.

B. Exposed concrete: B-B Plyform, Class I or II, EXT-APA, Metal or fiberglass forms may be used.

C. Construction joint forms for slabs-on-grade: Key-type steel formers, Vulcan Screed Joints, Burke Keyed Kold Joint Form, Dayton Sure-Grip G-20, or equal.

D. Expansion joint filler: Asphalt impregnated, premolded fiberboard by full thickness of slab or joint. ASTM D994-71. (Reapproved 1982.)

E. Form coating: Non-staining mineral oil.

F. Form ties: Snap-off type which will break off at least 1/2" below surface of concrete. For sanitary structures, the form ties shall be of surface leaving an opening no larger than the tie diameter, without cones. Wall ties for structures containing or to retain liquids shall have integral water stops.

2.2 EARTH FORMS

A. Where soil is firm enough to permit cutting to true size, concrete may be placed without forms.

PART 3 - EXECUTION

3.1 ERECTING

A. Erect forms to obtain shapes, designs and dimensions indicated. Make forms sufficiently tight to prevent leakage. Brace, shore and tie forms together to maintain position without sagging or bulging.

B. Provide 3/4" chamfering at corners (exposed or unexposed).

C. Prepare insides of forms so that concrete will have a smooth, uniform finish, free from fins, stone pockets, voids and other surface defects.

D. For slabs-on-grade, provide construction joint forms where concrete placement terminates at the end of a day or because of other reasons.

E. For structural members, provide bulkheads, with reinforcing steel penetrating bulkheads, where concrete placement stops at end of day or for other reasons.

F. Where soil conditions are such that concrete cannot be placed without forms, and where other conditions cause trenches to be opened wider than footing or slab widths, erect forms for footing or slabs.

3.2 PREPARING

A. Prepare insides of forms so that concrete will have a smooth, uniform finish free of surface defects.

B. Coat forms before reinforcement steel is placed. Where mill-oiled forming material is used, follow manufacturer's instructions for recoating. Where forming material is not mill-oiled, coat forms before each use.

C. Before reusing forms, thoroughly clean them and remove projecting nails or similar devices.

3.3 FORM REMOVAL

A. Remove forms in such manner and such time as to insure safety of structure and to avoid chipping and spalling of concrete. Refer to Section 6.2 of ACI 318-89, Section 6.2 of the Commentary to ACI 318-89, and Section 3.7 of ACI 347R-88 for form removal requirements.

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCING

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Section 03 10 00 - Concrete Forming.

B. Section 03 30 00 - Cast-in-Place Concrete.

1.2 SUBMITTALS

A. Submit warranty from mill or supplier stating that materials meet requirements of referenced ASTM and ACI Standards.

B. Detail reinforcing steel in accord with ACI 315-80 (Revised 1986), "Details and Detailing of Concrete Reinforcement." Submit shop drawings indicating bending and placement of reinforcement as well as sleeve and built-in work locations. Submit shop drawings for similar slabs and/or full column stacks at the same time. Shop drawings shall include the following note completed and signed by the contractor: “The data submitted does not contain material deviation from requirements of contract documents.”

1.3 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site in bundles marked with metal tags for easy identification.

B. Handle and store materials to prevent contamination.

C. Deliver and store welding electrodes in accordance with American Welding Society D 1.4-79.

PART 2 - PRODUCTS

2.1 REINFORCEMENT STEEL

A. ASTM A616-87a, Grade 60.

2.2 REINFORCEMENT WIRE

A. Welded steel wire fabric, ASTM A185-85.

2.3 BAR SUPPORTS

A. Bar supports and spacing of bar supports shall be as per recommendations set forth by Chapter 3 of the CRSI Manual of Standard Practice, 27th Edition, 2001.

2.4 OTHER SUPPORTS

A. Concrete brick may be used to support reinforcement to obtain proper clearance from earth and rigidity of reinforcement under concreting operations.

2.5 TIE WIRE

A. Wire shall be 16-1/2 gauge or heavier, black-annealed.

2.6 FABRICATING

A. In accordance with CRSI Manual of Standard Practice, 27th Edition, 2001.

PART 3 - EXECUTION

3.1 CONDITION OF SURFACES

A. Maintain reinforcement surfaces free of mud, oil or other coatings that might impair bond as described in Section 7.4 of ACI 318-89. Rust or mill scale is acceptable provided the minimum dimensions are not less than applicable ASTM Standards. Loose rust scale to be removed with wire brush.

3.2 INSTALLING REINFORCING STEEL

A. Handle, place and tie reinforcement steel in accordance with "Building Code Requirements for Reinforced Concrete," ACI 318-89 and CRSI publication "Placing Reinforcing Bars," 4th Edition, 1981.

B. All reinforcement bars shall be supported and secured as directed in ACI 315-94 and CRSI Manual of Standard Practice, 27th Edition, 2001.

C. For all splices, unless noted otherwise, provide the following lap splice length of reinforcement steel:

In concrete member: Class B
In masonry member: 48 bar diameters

Do not splice reinforcement steel except as authorized by Architect.

D. Accomplish welding in accordance with American Welding Society publication "Recommended Practices for Welding Reinforcing Steel, Metal Inserts, and Connections in Reinforced Concrete Construction," AWS D1.4-79.

E. Bend bars cold. Do not field bend bars partially embedded in concrete except as specifically permitted by Architect. Do not heat or cut bars with a torch.

3.3 INSTALLING WELDED WIRE FABRIC

A. For Slabs-on-Grade:
   1. Install welded wire fabric after vapor barrier (or under floor waterproofing, if applicable) has been placed.
   2. Locate welded wire fabric in center third of slabs.

B. For Slabs on Metal Form:
   1. Provide W.W.F. 6 x 6 - W1.4 x W1.4, unless noted otherwise on drawings.
   2. Locate welded wire fabric at mid-depth of slab measured between top of slab and top of metal form.

C. Lap side one full mesh plus 2 inches. Lap end two full meshes. Offset end laps in adjacent width to prevent continuous laps.

3.4 CONCRETE PROTECTION FOR REINFORCEMENT

A. Protect reinforcing by thickness of concrete indicated on Contract Drawings.

B. Variation from clear cover shall conform to section 7.5 of ACI 318-89.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Cast-In-Place Concrete.

B. Vapor Barrier, under slab on grade.

1.2 RELATED SECTIONS

A. Section 03 10 00 - Concrete Forming.

B. Section 03 20 00 - Concrete Reinforcing.

1.3 SUBMITTALS

A. Submit concrete mix designs with supporting data confirming compliance with ACI 318-89, Chapter 5 and this specification. Indicate types and quantities of materials used, the fresh unit weight, compressive strength, slump, air content and aggregate analysis in mix design.

B. Submit certification showing that the aggregate, cement, and all admixtures conform to these specifications.

C. Submit laboratory test report indicating type of concrete furnished, compressive strength, slump, air content, and water added to concrete after batching.

D. Retain ready-mix delivery tickets at job site for inspection by Architect.

E. All submittals shall include the following note completed and signed by the contractor: "The data submitted does not contain material deviation from requirements of contract documents except as follows: _____, _____."

F. Submit Testing Laboratory reports verifying that all column base plates have been grouted with the specified non-shrink grout.

1.4 QUALITY ASSURANCE

A. Included in the responsibilities for concrete testing are the taking, handling, protecting and storing of test specimens, and the accurate reporting of compressive strength, weight of cylinders, or content of concrete, slump, air content and location of concrete. If the concrete fails to meet any part of the specifications, immediately notify Architect to obtain instructions.

B. Laboratory will be required to obtain samples, in accordance with ASTM C31-88 and perform compression test per ASTM C39-86; air content tests per ASTM C138-81 (gravimetric method), ASTM C173-78 (Volumetric method) or ASTM C231-82 (pressure method); slump test per ASTM C143-78.

C. Laboratory will test the number of cylinders specified below for each 150 cubic yards, or fraction thereof, or for each 5000 square feet of surface area for slabs or walls, whichever is smaller, of each class of concrete placed each day.
   1. 2 at 7 days for information.
   2. 2 at 28 days for acceptance.
   3. 2 at time directed by Architect if cylinders tested at 28 days do not indicate acceptable strength.

1.5 EVALUATION AND ACCEPTANCE OF CONCRETE

A. Concrete strength will be evaluated by the Architect according to the provisions of ACI 318-05, Section 5.6. Should evidence of low-strength concrete exist, or if test results indicate non-conformance with these specifications, additional investigation, as outlined in ACI 318-05, Section 5.6.4 may be directed by the Architect. All such investigation, including the cost of the Architect's time, shall be at the Contractor's expense.

B. If, after additional investigation, evidence of low-strength concrete still exists, load tests in accordance with Chapter 20 of ACI 318-05 may be ordered by the Architect. In the event the concrete is determined to be inadequate by the Architect, the Contractor will remove it from the Project and replace it with concrete conforming to these specifications, subject to all testing requirements herein. All such remedial work shall be at the Contractor's expense.

C. The Contractor shall be fully responsible for ensuring that all concrete and concrete placement are in accordance with the Project Specifications. Failure of Architect or Testing laboratory to detect defective work, workmanship, or materials shall in no way prevent rejection and the Contractor taking approved corrective action when such defects are discovered. The Architect or the Testing Laboratory shall not, thereby, be obligated to make a final acceptance.

1.6 CONCRETE QUALITY DESIGN

A. All concrete mix designs shall be proportioned in accordance with Section 5.3 (field experience and/or trial mixtures) of ACI 318-05. Submit mix design for each class of concrete. If a standard deviation analysis is used, the concrete shall achieve an average strength in accordance with 5.3.2.1 of ACI 318-05. If trial mixtures are used, the proposed mix design shall achieve an average strength in accordance with Table 5.3.2.2 of ACI 318-05. Submittals made that do not conform to Section 5.3 of ACI 318-05 shall be rejected.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when temperature is below 40 degrees F (4.5 degrees C), or forecasted to go below 40 degrees F within 24 hours, unless adequate heating and protecting equipment is on hand to warm concrete. In these circumstances, use heating and protecting equipment continuously until concrete has set and for at least 72 hours after placing.

B. Perform cold weather concrete work in accordance with ACI 306R-88, "Cold Weather Concreting, 1989.

C. Perform hot weather concrete work in accordance with ACI 305R-89, "Hot Weather Concreting, 1989."

D. When high temperatures and/or placing or humidity conditions dictate, the mix may be initially retarded by use of the water reducing, retarding formulation (Type D) or the specified water reducing admixture (Type A).

1.8 REFERENCES

A. The following references shall be obtained by the contractor and maintained at the job site in a readable condition at all times:
   1. ACI 318-89, Building Code Requirements for Reinforced Concrete.
   2. ACI 315-80, (Revised 1986) Details and Detailing of Concrete Reinforcement.
   3. ACI 306R-88, Cold Weather Concreting.
   4. ACI 305R-89, Hot Weather Concreting.
   5. ACI 302.1R-89, Guide for Concrete Floor and Slab Construction.
   6. ACI 301-89, Specifications for Structural Concrete for Buildings.
   7. Manufacturer's Instructions of all products required for proper use or installation of the product.

1.9 ADDITIONAL QUANTITIES

A. Provide an additional two cubic yards (2 C.Y.) of cast in place concrete to be used under discretion of the Owner and Architect.

PART 2 - PRODUCTS

2.1 PORTLAND CEMENT

A. ASTM C150-86, Type I. Use only one brand.

B. For watertight structures the following additional limitation shall apply:
1. The cement shall contain no more than 8 percent tri-calcium aluminate.

2.2 NORMAL WEIGHT AGGREGATE

A. Fine aggregate: Natural siliceous sand conforming to ASTM C33-86.

B. Coarse Aggregate: Washed gravel or crushed stone, ASTM C33-86. Size coarse aggregate in accordance with ACI 318-89, Chapter 3, subparagraph 3.3.2.

2.3 LIGHTWEIGHT AGGREGATE

A. Fine Aggregate: Shall conform to ASTM C330-87.

B. Coarse Aggregate: Shall conform to ASTM C330-87.

C. The lightweight aggregate shall be presoaked per ACI 304.2 R, section 4.3.2

2.4 WATER

A. Clean water, free from elements which might adversely affect concrete, and embedded items.

2.5 ADMIXTURES

A. Water Reducing Admixture: Eucon WR-75 or WR-89 by The Euclid Chemical Company, Pozzolith 322N by Master Builders, Plastocrete 160 by Sika Chemical Corporation. The admixture shall conform to ASTM C494-86, Type A, and not contain more than 0.05 percent chloride ions.

B. Water Reducing Admixture: Eucon Retarder-75 by The Euclid Chemical Company, Pozzolith 100 XR by Master Builders, Plastiment Chemical Corporation or equal. The admixture shall conform to ASTM C494-86, Type D, and not contain more than 0.05 percent Chloride ions.

C. High Range Water Reducing Admixture/(Superplasticizer); Eucon 37 by The Euclid Chemical Company, Rheobuild 1000 by Master Builders, Sikament by Sika Chemical Corporation. The admixture shall conform to ASTM C494-86, Type F or G, and not contain more than 0.05 percent chloride ions.

D. Non-Corrosive, Non-Chloride Accelerator: "Accelguard 80" by The Euclid Chemical Company or approved equal. The admixture shall conform to ASTM C494-86, Type C or E, and not contain more chloride ions than are present in municipal drinking water. The admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least a year's duration) using an acceptable accelerated corrosion test method such as that using electrical potential measures.

E. Air Entraining Admixture: Conforming to ASTM C260.

F. Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions are not permitted.

G. Certification: Written conformance to the above mentioned requirements and the chloride ion content of the content of the admixture will be required from the admixture manufacturer prior to mix design review by the Engineer.

2.6 FLY ASH

A. Shall conform to ASTM C618-87 Class F.

2.7 READYMIX CONCRETE

A. In accord with ASTM C94-86b, Alternative No. 2.

B. Strength at 28 day: As specified on the Structural Drawings.

C. Air Content: Provide entrained air in accordance with ACI 302.1R-89. Table 5.2.7 within tolerances specified. Concrete subject to freezing and thawing and/or deicers shall be categorized as "severe exposure". All other concrete shall be categorized as "moderate exposure."

D. Water-Cement Ratio: All concrete exposed to freezing and thawing shall have a maximum water-cement ratio of 0.50. All concrete subjected to deicers and/or required to be watertight shall have a maximum water-cement ratio of 0.45 (4500 psi at 28 days or more.) All reinforced concrete subjected to brackish water, salt spray or deicers shall have a maximum water/cement ratio of 0.40 (5000 psi at 28 days or more).

E. Slump: All concrete containing the high-range water-reducing admixture (superplasticizer) shall have a maximum slump of 9" unless otherwise approved by the Architect. The concrete shall arrive at the job site at a slump of 2" to 3", (3" to 4" for concrete receiving a "shake-on" hardener or lightweight concrete), be verified, then the high-range water-reducing admixture added to increase the slump to the approved level. All other concrete shall have a maximum slump of 4 inches.

F. Maximum water soluble chloride ion concentrations in hardened concrete at an age of 28 days contributed from the ingredients including water, aggregates, cementitious materials and admixtures shall not exceed the limits established in Table 4.3.1 of ACI 318-89.

G. Admixtures: All concrete shall contain the specified water reducing admixture or high range water reducing admixture (superplasticizer). At the Contractor's option, both water reducing admixtures may be included in the concrete mix. All concrete slabs placed at air temperatures below 50 degrees Fahrenheit shall contain the specified Non-Chloride, Non-Corrosive accelerator. All concrete required to be air entrained shall contain the approved air entraining admixture. All pumped concrete, and concrete with a water-cement ratio below 0.50 shall contain the specified high range waterreducing admixture (superplasticizer).

2.8 VAPOR BARRIER

A. 10 mil polyethylene sheeting conforming to ASTM E154-68.

2.9 BOND BREAKER

A. 30# and 90# asphalt saturated roofing felt.

2.10 EXPANSION JOINT FILLER

A. Use Ceramar Flexible Foam Expansion Joint Filler by W. R. Meadows or approved equal at locations indicated on the drawings.

2.11 CURING COMPOUND

A. Clear Curing and Sealing Compound (VOC compliant): The compound shall have 30 percent solids content minimum, and will not yellow under ultra violet light after 500 hours of test in accordance with ASTM C309-81 and will have a maximum moisture loss of 0.039 grams per sq. cm. when applied at a coverage rate of 250 sq. ft. per gallon.

Product shall be "Super Aqua Cure VOX" or "Super Diamond Clear VOX" by The Euclid Chemical Company.

2.12 SHEET MATERIAL FOR CURING CONCRETE

A. Waterproof paper or polyethylene film as per ASTM C171-69.

2.13 BONDING COMPOUND

A. Euco Weld by The Euclid Chemical Company, Weldcrete by The Larsen Company, or Everbond by L and M Construction Chemicals, or approved equal. Interior use only.

2.14 EPOXY ADHESIVE

A. The compound shall be a two (2) component, 100 percent solids, 100 percent reactive compound suitable for use on dry or damp surfaces, "Euco Epoxy No. 452MV Eucopoxy LPL" by The Euclid Chemical Company or "Sikadur Hi-Mod" by The Sika Chemical Corporation.

2.15 NON-SHRINK GROUT

A. The non-shrink grout shall be "Euco NS" by The Euclid Chemical Company, or "Masterflow 713" by Master Builders. The factory pre-mixed grout shall conform to ASTM E1107, "Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)." In addition, the grout manufacturer shall furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95 percent bearing under a 4' x 4' base plate.

B. Where high fluidity and/or increased placing time is required use "Euco Hi-Flow Grout" by The Euclid Chemical Company or "Masterflow 938" by Master Builders. In addition, the grout manufacturer shall furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95 percent bearing under an 18" by 36" base plate.

2.16 CONCRETE FLOOR TOPPING AND MORTAR

A. Underlayment: Free-flowing, self-leveling, pumpable cementitious base compound, "Flo-Top" by The Euclid Chemical Company or approved equal.

B. Repair Topping: Self-leveling, polymer modified high strength topping, "Thin Top SL" by The Euclid Chemical Company.

C. Polymer Patching Mortar: "Euco Thin Coat, Concrete Coat" (horizontal repairs) "Verticoat LPL" (Vertical and overhead repairs) by The Euclid Chemical Co. or "Sikatop 121 or 122" (horizontal repairs), "Sikatop 123" (vertical and overhead repairs) by Sika Chemical Corp. The low shrinkage structural repair mortar shall be a one component polymer, micro silica modified, high strength concrete repair mortar. This repair mortar only requires the addition of water at the jobsite. Produce shall be "SR-93" by The Euclid Chemical Company.

2.17 WATERSTOPS

A. Waterstops at construction joints shall be Greenstreak Plastic Products, Division of Western Textile Products Company, P.O. Box 7139, St. Louis, MO 63177, #784; or Vinylex Corp., P.O. Box 7187, Knoxville, TN 37921, #RB6-12; or Vulcan Metal Products, Inc., P.O. Box 6788, Birmingham, AL 35210, #8071; or equal. Where indicated, waterstops shall be Synko Flex pre-formed plastic adhesive waterstop by Synko-Flex Products, Inc., 4801 Woodway, Houston, Texas 77056 (1-800-231-4551).

2.18 NEOPRENE PADS

A. Neoprene pads indicated on Contract Drawings shall be William Dense Neoprene Rubber, 1200 Series, 60 Durometer, or approved equal.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. As concrete is delivered, the Testing Laboratory will make cylinders according to 1.3.C above. In addition, the Testing Laboratory will take small batches of the same concrete used for making cylinders for making slump tests and air entrainment tests. Assist the Laboratory in taking samples and furnish concrete required for making test.

3.2 CONDITION OF SURFACES

A. Notify Testing Laboratory at least 48 hours before starting concrete placement. Placement may proceed provided no defective workmanship or materials are detected by inspecting personnel.

B. Place no concrete until reinforcement and other embedded items are positioned and secured.

C. Forms, surfaces, and trenches shall be free from water, mud, ice, frost and debris when concrete is placed.

D. Wet Surfaces before placing concrete.

3.3 VAPOR BARRIER

A. Place vapor barrier under all slabs placed on earth or aggregate. Place smoothly, without wrinkles and trapped air. Lap side and end joints at least 6" (15 cm) and weight down sheeting to avoid blowing. Turn vapor barrier up 4" (10 cm) at vertical surfaces. Keep unnecessary traffic off of vapor barrier.

3.4 BOND BREAKERS

A. Where separation from a vertical surface is desired, place 12" wide strips of 30# felt, creased at a right angle in the long direction, at all vertical surfaces, except where fiberboard is to be installed. Turn up on vertical surfaces for full thickness of concrete.

B. Where floor slabs bear on tops of foundations, place a 90# strip of felt, full width of bearing surfaces, on all bearing surfaces.

3.5 PRODUCTION OF CONCRETE

A. Produce concrete in accordance with Chapter 7 of ACI 301-89 for ready-mixed concrete.

3.6 PLACING CONCRETE

A. Prepare place of deposit and equipment. Convey and place concrete in accordance with ACI 301-89, Chapter 8, Paragraphs 8.1 through 8.3. Certain parts of those paragraphs are modified below, and where modifications conflict with those paragraphs or add additional instructions they should take precedence over the printed paragraphs of ACI 301-89.

B. Variation from clear cover and depth of members shall conform to section 7.5 of ACI 318-05.

C. Deposit concrete within 1-1/2 hour after water is added to dry batching, or use retarding admixture.

D. Convey concrete promptly to point of use in manner which will prevent separation of ingredients and loss of water. Deposit concrete near its final position to avoid rehandling.

E. Consolidate concrete, including floor slabs, in accordance with ACI 309R-87, "Recommended Practice for Consolidation of Concrete". All concrete shall be vibrated. Maintain at least one vibrator as a stand-by. Lower frequency vibrators may be used with "flowing" concrete.

F. Do not use vibrators to cause concrete to flow.

G. Concrete column pour shall not extend more than 3/4 inch into the concrete slab. Chip off any concrete that exceeds this dimension.

3.7 CONSTRUCTION JOINTS AND EMBEDDED ITEMS

A. Construction joints and embedded items shall conform to Chapter 6 of ACI 301-89. Location of all construction joints shall be approved by the Architect.

3.8 FINISHING

A. After placing concrete, screed to levels and slopes indicated. Do not use tamping tools to force aggregate away from surface.

B. When the water sheen has disappeared, use a wood float as indicated. Floated surface shall achieve an FF20/FL17 tolerance.

C. Where troweled finish is required, the surface shall initially receive a float finish. The surface shall then be troweled, at least twice, to a smooth dense finish. Remove small imperfections left by troweling machine and bring to a smooth, dense, polished finish by hand troweling. Continue troweling until a ringing sound is produced as the trowel is moved over the surface. Surface shall achieve an FF25/FL20 (FL17 for elevated slabs) tolerance.

D. Broomed finish (at all ramps and parking decks). The surface shall be given a coarse transverse scored texture by drawing a broom or burlap belt across the surface. This operation shall follow immediately after floating. Texture shall be as approved by the Architect from sample panels.

E. Do not use dry materials, such as sand and cement, on surfaces during finishing.

F. Do not use any procedures, such as the addition of water to the concrete surface, that produces a layer of weak material with an increased water-cement ratio at the slab surface.

G. The specified underlayment or repair topping shall be used where surfaces do not achieve their specified tolerances.

H. Where floors are to be covered with thin set tile, trowel as specified above and then broom surfaces to form a "tooth."

3.9 CURING

A. As finished work is completed, begin curing. Curing may be accomplished by either of the methods described below, except for items specifically designated for a particular method.

B. Waterproof paper or plastic film curing: Cover damp surfaces with film or paper and lap at edges at least 4 inches. Apply weights to prevent displacement. Repair tears and punctures as they occur.

C. All exposed interior slabs and troweled slabs receiving mastic-applied adhesives or metallic or mineral aggregate hardeners shall be cured with the curing and sealing compounds. Exterior slabs, sidewalks, curbs, architectural concrete and any concrete where total resistance to yellowing from ultra-violet light and water exposure is required shall be cured with the specified clear, non- yellowing curing and sealing compound.

D. Do not use curing and sealing compounds on surfaces receiving applied finishes other than resilient tile or carpet.

E. Where forms are left in place, keep forms damp by spraying at frequent intervals for at least 8 days. Do not allow forms to dry out.

3.10 PROTECTION

A. Protect concrete for at least 48 hours after finishing is complete. Erect barriers as necessary to protect uncured areas. Provide wood covers to protect uncured areas. Provide wood covers to protect concrete step-ups.

B. Protect concrete from paint and other stains, and from abrasive traffic.

3.11 PATCHING

A. After forms are removed do not patch or repair, except that fins may be removed back to formed surfaces, until Architect has examined the work. After inspection by Architect, patch voids, honeycombs, spalls, chips, as directed.

B. Cut out honeycomb, rock pockets, voids over 1/4" in any dimension, and holes left by tie rods and bolts, down to solid concrete, but in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface. Before placing cement mortar, thoroughly clean, dampen with water and apply the specified bonding compound. The cement mortar shall be placed after the bonding compound has dried. In areas subjected to moisture, the specified epoxy adhesive shall be used. The patching mortar shall be placed while the epoxy adhesive is still tacky.

C. Rub exposed interior finished concrete as specified above. Where form marks and fins detract from appearance or are otherwise objectionable remove them by rubbing.

D. The specified patching mortar may be used in lieu of the bonding compound and patching mortar with prior approval of the Engineer, when color match of the adjacent concrete is not required.

E. All overhead and vertical surface repairs shall be made with the specified polymer repair mortar (gel consistency).

F. All structural repairs shall be made with prior approval of the Engineer, as to the method and procedure, using the specified epoxy adhesive and/or epoxy mortar or the polymer repair mortar gel formulation. Where epoxy injection procedures must be used, an approved low viscosity epoxy made by the manufacturers previously specified shall be used.

3.12 FLOOR TOPPING PLACEMENT

A. Clean substrate of oil, grease or other contaminants and broom clean. Apply primer to the substrate as recommended by the manufacturer. Place topping over primed substrate continuously in a thickness of approximately one inch. Protect completed topping from damage during remainder of construction with wood planking or similar material.

B. The underlayment topping shall be used for interior surfaces receiving applied finishes. The repair topping shall be used in all other areas.

3.13 GROUTING

A. All column base plates, equipment bases, and other locations noted on the Contract Drawings, shall be grouted with the specified non-Shrink, non-metallic grout.

B. After steel columns have been erected and shimmed to proper height, grout under column base plates with specified grout.

C. Where high fluidity and/or increased placing time is required use the specified high flow grout. This grout shall be used for all base plates larger than 10 sq. ft.

3.14 CLEAN-UP

A. Clean up and leave concrete work free from any loose material. Remove any mortar spills from floors or other materials. Leave areas free from any debris.

B. Remove excess material and equipment from site when work is completed.

END OF SECTION

SECTION 04 10 00

MORTAR AND MASONRY GROUT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Mortar and grout for unit masonry.

1.2 RELATED SECTIONS

A. Section 012100 – Allowances.

B. Section 042113 – Brick Masonry.

1.3 SUBMITTALS

A. Samples: Submit two samples of mortar, illustrating mortar color and color range.

1.4 FIELD SAMPLE

A. Incorporate mortar in field sample specified in Section 042113.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 530 and ACI 530.1.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

B. Hot Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Hot Weather Masonry Construction.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Masonry Cement: Not permitted for exposed, unpainted surfaces.

B. Masonry Mix for Colored Mortar: Pure ground mineral oxides, non-fading and alkali-proof, contained in sealed unit bags.
   1. Acceptable manufacturers include:
      a. Blue Circle Cement Company.
      b. Riverton Corporation.
      c. Tamms Industries Co.
      d. United States Cement Company.
   2. Type 'N', 'S' or 'M', conforming to ASTM C270.
   3. Color: To be selected by Architect.
   4. Use one brand of material throughout the Work.

C. Portland Cement: ASTM C150-85, Type 1.

D. Hydrated Lime: ASTM C207-79, Type S.

E. Mortar Aggregate: ASTM C144-84.
   1. Use natural river sand with colored mortar.

F. Grout Aggregate:
   1. Fine: ASTM C144-84.
   2. Coarse: ASTM C404-85, 3/8" maximum size.

G. Water-Reducing Admixture:
   1. "Accelguard 80", manufactured by the Euclid Chemical Company.

H. Water: Clean and potable.

2.2 MORTAR MIXES

A. Mortar in contact with earth: Type M. Proportion cement, up to 1/4 part hydrated lime, fine aggregate of 2-1/4 to 3 times the volume of cementitious materials.

B. Mortar for reinforced masonry: Type S. Proportion 1 part portland cement, 1/4 to 1/2 part hydrated lime, dine aggregate of 2-1/4 to 3 times the volume of cementitious materials.

C. Mortar for other applications: Type N. Proportion 1 part portland cement, up to ½ to 1-1/4 parts hydrated lime, fine aggregate of 2-1/4 to 3 times the volume of cementitious materials.

2.3 MORTAR MIXING

A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C94.

2.4 GROUT MIXES

A. Grout for non-reinforced masonry: Type S with additional water to produce pouring consistency.

B. Grout for reinforced masonry: Comply with ASTM C476-83. Proportion 1 part portland cement, up to 1/10 part hydrated lime, fine aggregate of 2-1/4 to 3 times the volume of

cementitious materials, and coarse aggregate of 1 to 2 times the volume of cementitious materials.

2.5 GROUT MIXING

A. Mix grout in accordance with ASTM C94.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Do not indiscriminately substitute mortar of higher compressive strength than that specified.

B. Work grout into masonry cores and cavities to eliminate voids. Do not displace reinforcement.

C. Mix mortar in mechanical mixer for a minimum period of 5 minutes after all materials are placed in the mixer with the amount of water required to produce the desired workability. Mix colored mortar to produce uniform color throughout.

D. If water is lost due to evaporation, retemper by adding water to restore required consistency.

E. Do not permit mortar to stand more than one hour without remixing.

F. Do not use mortar which has begun to set or is not placed within 2-1/2 hours after initial

mixing.

G. Rake out exposed grout joints adjacent to colored mortar and tuckpoint joints with colored pointing mortar.

END OF SECTION

SECTION 04 21 13

BRICK MASONRY

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Face Brick.

B. Concealed Flashing.

C. Anchors and Ties.

D. Masonry Cleaner.

1.2 RELATED SECTIONS

A. Section 012100 – Allowances.

B. Section 041000 – Mortar and Masonry Grout.

1.2 REFERENCES

A. Brick Institute of America (BIA) Technical Notes on Brick Construction No. 7 “Water Resistance of Brick Masonry Design and Detailing” is used as a reference standard for the installation of flashing.

B. Brick Institute of America (BIA) Technical Notes on Brick Construction No. 30 “Bonds and Patterns in Brickwork” is used as a reference standard for definition of pattern bond and mortar joint types.

C. BIA Technical Notes on Brick Construction No. 20 “Cleaning Brick Masonry” is used as a reference standard for cleaning methods, materials, testing, and procedure.

1.3 FIELD SAMPLE

A. Construct Field sample, 4 ft. long x 4 ft. high.

B. Field sample to show:
   1. Range and distribution of variation in color and texture.
   2. Pattern Bond.

3. Mortar joint.
4. Workmanship.

C. Provide under provisions of Section 014000.

1.4 SUBMITTALS

A. Submit product data for each accessory item.

B. Submit samples of face brick.
1. Include not less than five bricks.
2. Show extreme variations in color and texture.

C. Submit under provisions of Section 013300.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Install when ambient air temperature is 40 degrees F and rising, minimum, and expected to remain at 40 degrees F or higher for at least 24 hours after installation.

B. Cold Weather Protection: Protect in-place masonry as follows:
1. Average daily air temperature 40 degrees to 32 degrees F: Protect masonry from rain or snow for 24 hours after erection.
2. Average daily air temperature 32 degrees to 25 degrees F: Cover masonry for 24 hours after erection.
3. Average daily air temperature below 20 degrees F:
a) Provide enclosures and heat to maintain air temperature above 32 degrees F.
b) Maintain constructed masonry temperature above 32 degrees F for 24 hours after erection with enclosures and supplemental heat.

C. Hot Weather Protection: Protect masonry construction from; direct exposure to wind and sun when erected in an ambient air temperature of 99 degrees F in the shade with relative humidity less than 50%.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Flashing and Flashing Mastic:
1. York Manufacturing.
2. AFCO Products, Inc.

B. Accessories:
   1. Dur-O-Wal, Inc.
   2. Hohmann & Barnard, Inc.
   3. Masonry Reinforcing Corporation of America.
   4. National Wire Products Corporation.

2.2 FACE BRICK

A. Field Brick: To be selected by Architect within allowance.
   1. Size: Modular, Manufactured size, 3-5/8" x 2-1/4" x 7-5/8".
   2. Color and Texture: Selected by Architect.

B. Comply with ASTM C216, Grade SW, Type FBS.

C. Provide special shapes for applications requiring brick of form, size, or finish on exposed surfaces which cannot be produced from standard brick sizes by cutting.

D. For applications resulting in exposure of brick surfaces which otherwise would be concealed from view, provide uncored or unfrogged units with all exposed surfaces finished.

2.3 COMMON BRICK

A. Comply with ASTM C 62-84a, Grade MW except Grade SW for vertical surfaces in contact with earth and for other than vertical surfaces.

2.4 ACCESSORIES

A. Cavity/Composite Wall Reinforcement (masonry backup): Truss type with adjustable hook and eye at 24" o.c. maximum. Minimum 9 gauge side bars and 9 gauge cross bars, conforming to ASTM A82, galvanized per ASTM A153, Class B2, 3/16" diameter adjustable ties, galvanized in accordance with ASTM A641, Class 3;
   1. Dur-O-Wal – D/A 370 Dur-O-Eye.
   2. Wire-Bond – Series 900 cavity.
   3. Hohmann & Bernard Inc. – 170.

B. Veneer Anchors (exterior cavity walls with steel stud back-up): Hot-dip galvanized, clip-on ties, 12 gauge stud plate, with 3/16" diameter adjustable triangular tie, cadmium-plated fasteners;
   1. Dur-O-Wal – D/A 213.
   2. Wire-Bond – Type II, 1001 with 1100 tie.
   3. Hohmann & Bernard Inc. – DW-10-X, Vee Tie.

C. Concealed Flashing: 3 ounce per square foot copper permanently bonded with asphalt compound between two layers of woven glass fabric. Acceptable manufacturers include:
   1. York Manufacturing, Inc. – Copper Fabric Flashing.
   2. AFCO Products, Inc. – Copper Fabric.
   3. Phoenix Building Products – Type FCC.

D. Concealed Flashing Mastic: Cop-R-Tite Mastic, manufactured by York Manufacturing, Inc. or equivalent by acceptable manufacturers of concealed flashing.

E. Weep/Vent Products: Use the following, unless otherwise indicated:
   1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe, in color selected from manufacturer's standard.
      a. Advanced Building Products Inc.; Mortar Maze weep vent.
      b. Dayton Superior Corporation, Dur-O-Wal Division; Cell Vents.
      c. Heckmann Building Products Inc.; No. 85 Cell Vent.
      d. Hohmann & Barnard, Inc.; Quadro-Vent.
      e. Wire-Bond; Cell Vent.
   2. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity. Strips, full-depth of cavity and 10 inches (250 mm) wide, with dovetail shaped notches 7 inches (175 mm) deep that prevent mesh from being clogged with mortar droppings.
      a. Mortar Net USA, Ltd.; Mortar Net.

2.5 MASONRY CLEANER

A. Sure Klean 600 Detergent, manufactured by ProSoCo, Inc.

PART 3 - EXECUTION

3.1 PREPARATON

A. Wet bricks having initial rate of absorption of not more than 30 grams per 30 square inches per minute, when measured in accordance with ASTM C 67-85, so that rate of absorption when laid does not exceed this amount.

B. Layout wall in advance for accurate spacing of surface bond patterns, to provide uniform joint widths, and to properly locate openings, expansion joints, returns and offsets. Avoid the use of less-than-half size units at corners, jambs, and wherever possible at other locations.

3.2 INSTALLATION

A. Use face brick for applications where brick is exposed. Use common brick where brick is indicated in concealed locations.

B. Pattern Bond:
   1. Lay exposed brick in running bond.
   2. Bond unexposed units in a wythe by lapping 2” minimum.
   3. Bond and interlock each course of each wythe at corner.

C. Attach brick to inner wythe with joint reinforcing provided in Section 042200 - Concrete Unit Masonry. Embed joint reinforcing in masonry joints.
   1. Provide anchors 16” o.c., maximum, vertically and 16” o.c., maximum horizontally.
   2. Maintain not less than 2” space between wythes. Keep spaces clear and free of mortar.

D. Install flashing as follows:
   1. At composite masonry walls, including cavity walls, extend flashing 1/4 inch past exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 8 inches, and through the inner wythe to within 1/2 inch of the interior face of the wall in exposed masonry. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2 inches.
   2. At openings, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form a pan.
   3. At flashing joints, overlap flashing 4 inches and seal with flashing mastic.

E. Provide weeps in exterior wythe, located immediately above flashing, spaced 1’-4” o.c.

F. Keep cavity clean by placing wood strips with attached wire pulls on metal ties.

G. Lay brick plumb and true to line, with uniform face joints. Lay units with completely filled mortar joints. Butter ends to fill head joints and shove in place.

H. Fill collar joints between wythes with mortar. Fill after each course is laid.

I. When stopping work, rack back one-half unit length in each course. Do not tooth. When resuming work, wet units lightly and remove loose units and mortar prior to laying fresh units.

J. Joints:
   1. Provide concave tooled joints where exposed.

2. Provide struck joints for exterior joints below grade.
3. Provide raked joints, uniform ¾" deep, where sealant is indicated.
4. Provide flush joints for other locations.
5. Tool joints when mortar is thumb-print hard.

K. Allowable Tolerances:
1. Maximum variation from plumb:
a. In lines and surfaces of columns, walls, and arises:
1) 1/4 inch in 10 feet.
2) 3/8 inch in any story or 20 feet maximum.
3) 1/2 inch in 40 feet or more.
b. For external corners, expansion joints and other conspicuous lines.
1) 1/4 inch in any bay or 20 feet maximum.
2) 1/2 inch in 40 feet or more.
2. Maximum variation from level or grades for exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines.
a. 1/4 inch in any bay or 20 feet maximum.
b. 1/2 inch in 40 feet or more.
3. Maximum variation of linear building line from established position in plan and related portion of columns, walls, and partitions.
a. 1/2 inch in any bay or 20 feet maximum.
b. 3/4 inch in 40 feet or more.
4. Maximum variation in cross-sectional dimensions of columns and thicknesses of walls: Not less than 1/4 inch smaller nor more than 1/2 inch larger than walls.

3.3 PROTECTION

A. Protection of Work:
1. During erection, cover top of wall with strong waterproof membrane at end of each day or shutdown.
2. Cover partially completed walls when work is not in progress.
3. Extend cover minimum 24 inches down both sides.
4. Hold cover securely in place.

B. Protect sills, ledges, and projections from droppings of mortar. Protect door jambs and corners from damage during construction.

3.4 POINTING AND CLEANING

A. Immediately remove mortar or grout from face of brick to be left exposed.

B. Remove and replace masonry units which are loose, chipped, broken, stained, or

otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar, pointed to eliminate evidence of replacement.

C. Tuck-point defective joints. Rake mortar joints to depth of not less than 1/2", wet joint, and fill solidly with pointing mortar.

D. Clean exposed brick surfaces by the "bucket and brush hand cleaning method" in accordance with BIA Technical Notes No. 20.

E. Apply detergent to 4' x 4' area, at inconspicuous location for three to seven days. Insure detergent is not detrimental to brick before continuing.

END OF SECTION

SECTION 04 22 00

CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Concrete Unit Masonry.

B. Joint Reinforcement.

C. Reinforcing Bars.

D. Concealed Flashing.

E. Anchors and Ties.

F. Control and Expansion Joints.

1.2 RELATED SECTIONS

A. Section 041000 – Mortar and Masonry Grout.

B. Section 042113 – Brick Masonry.

1.3 REFERENCES

A. American Concrete Institute (ACI) “Specification for Concrete Masonry Construction (ACI 531.1)” is used as a reference standard for general requirements, products, and installation.

B. Brick Institute of America (BIA) Technical Notes on Brick Construction No. 30 “Bonds and Patterns in Brickwork” is used as a reference standard for definition of mortar joint types.

1.4 FIELD SAMPLE

A. Incorporate concrete unit masonry and joint reinforcement in field sample specified in Section 042113 – Brick Masonry.

B. Provide sample panels, per Section 2.1.4.1.2 of ACI 531.1.

C. Provide under provisions of Section 014000.

1.5 SUBMITTALS

A. Submit product data for each accessory item.

B. Product data, per Sections 2.1.4.3.1, 2.1.4.3.2, and 3.1.4.2 of ACI 531.1, is not required.

C. Other samples, per Sections 2.1.4.1.1, 2.1.4.1.3, and 3.1.4.1 of ACI 531.1, are not required.

D. Shop drawings, per Section 2.1.4.2 of ACI 531.1 are not required.

1.6 REGULATORY REQUIREMENTS

A. Where CMU walls or partitions are indicated to have fire resistance rating, provide units having minimum equivalent thickness in accordance with International Building Code, for the required rating.

B. Submit manufacturer's certification that masonry units comply with regulatory requirements.

1.7 QUALITY ASSURANCE

A. Comply with ACI 531.1, except as modified herein.
   1. Section 2.2.1.2, pertaining to clay masonry units, is not acceptable.
   2. Sections 2.2.2, 2.2.7, and 4.2.1, pertaining to mortar and grout materials, are not acceptable.
   3. Section 2.2.6.2, pertaining to precast concrete sills, lintels, and coping, is not applicable.

B. Testing per Section 2.1.5.2 and 3.1.5.1 of ACI 531.1, is not required.

C. Use of bottom ash for light-weight aggregate shall not exceed 20% of the total mix.
   1. Cinders are not permitted.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Flashing and Flashing Mastic:
   1. York Manufacturing.

2. AFCO Products, Inc.

B. Accessories:
1. Dur-O-Wal, Inc.
2. AA Wire Products Company.
3. Heckman Building Products, Inc.
4. Masonry Reinforcing Corporation of America.
5. National Wire Products Corporation.

2.2 CONCRETE MASONRY UNITS

A. Hollow Load-Bearing CMU: ASTM C90.
1. Lightweight.
2. Grade N.
3. Type 1, Moisture Controlled.
4. Compressive Strength: 1,900 psi.
5. Nominal 8” x 16” face.
6. Width as indicated.

B. Solid Load-Bearing CMU: ASTM C145.
1. Lightweight.
2. Grade N.
3. Type 1, Moisture Controlled.
4. Compressive Strength: 1,900 psi.
5. Nominal 8” x 16” face.
6. Width as indicated.

C. Hollow Non-Load Bearing CMU: ASTM C129.
1. Lightweight.
2. Type 1, Moisture Controlled.
3. Nominal 8” x 16” face.
4. Width as indicated.

D. Provide special units for corners, caps, sashes, pilasters, control joints, retaining walls, and bond beams as required.
1. Furnish 8” long units, similar to Sequatchie Concrete Services B4 or G4 Spandrel Blocks, for bond beams.
2. Where corners are exposed, provide rounded corner units.

E. Concrete Masonry Units shall conform to ASTM C90, Grade N-1, made with Stalite, or equivalent light weight aggregate. Units shall contain no combustion by-products or waste materials. All concrete blocks shall be UL listed or shall conform to requirements of the International Building Code for one-hour fire resistance. Concrete Masonry Units in 2-hour rated walls shall be UL certified as conforming to the required rating.

2.3 REINFORCING

A. Comply with ASTM C 62-84a, Grade MW except Grade SW for vertical surfaces in contact with earth and for other than vertical surfaces.

2.4 ACCESSORIES

A. Delete Section 3.2.1 of ACI 531.1.

B. Reinforcing Bars: ASTM A615-84a; Grade 60, deformed.

2.5 CONCEALED FLASHING

A. Concealed Flashing: Copper Fabric Flashing, manufactured by York manufacturing, Inc.

B. Concealed Flashing Mastic: Cop-R-Tite Mastic, manufactured by York Manufacturing, Inc.

2.6 JOINT REINFORCEMENT

A. Delete that portion of Section 3.2.4 pertaining to joint reinforcement and Section 3.2.6.5 of ACI 531.1.

B. Cavity/Composite Wall Reinforcement (masonry backup): Truss type with adjustable hook and eye at 24" o.c. maximum. Minimum 9 gauge side bars and 9 gauge cross bars, conforming to ASTM A82, galvanized per ASTM A153, Class B2, 3/16" diameter adjustable ties, galvanized in accordance with ASTM A641, Class 3;
   1. Dur-O-Wal – D/A 370 Dur-O-Eye.
   2. Wire-Bond – Series 900 cavity.
   3. Hohmann & Bernard Inc. – 170.

C. Joint Reinforcement - Single Wythe Walls and Partitions: Truss type, 9 gauge side bars and 9 gauge cross bars, formed to truss design, galvanized per ASTM A153, Class B2, width of joint reinforcement to extend to within 1" of each face of wall.
   1. Dur-O-Wal – Dur-O-Wal Truss.
   2. Wire-Bond – Series 300, 2 wire.
   3. Hohmann & Barnard Inc. – 120.

D. Provide prefabricated corner and tee sections.

2.7 ACCESSORIES

A. Delete Section 3.2.6.6 of ACI 531.1.

B. Control Joints: Regular D/A 2002, or No. 8 D/A 2006, as applicable, manufactured by Dur-O-Wal.

C. Expansion Joint Strip: #D/A 2015, manufactured by Dur-O-Wal. Width as indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with ACI 531.1.

B. Lay concrete masonry units in running bond.

C. Bond multiple wythe masonry with prefabricated joint reinforcement.

D. Anchor intersecting walls and partitions with joint reinforcement.

E. Toothing will not be permitted.

F. Install flashing as follows:
1. At composite masonry walls, including cavity walls, extend flashing 1/4 inch past exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 8 inches, and through the inner wythe to within 1/2 inch of the interior face of the wall in exposed masonry. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2 inches.
2. At openings, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form a pan.
3. At flashing joints, overlap flashing 4 inches and seal with flashing mastic.

G. Keep cavity clean by placing wood strips with attached wire pulls on metal ties.

H. Perform grouting by the low-lift method, in accordance with Section 4.3.2 of ACI 531.1. High-lift grouting, per Section 4.3.3 of ACI 531.1, will not be permitted.

I. Lap end joints in reinforcing not less than 6”.

J. Reinforcing shall be properly positioned so that not less than 5/8” mortar coverage over the side rods is obtained at the face of the masonry.

K. Joints:
1. Provide concave tooled joints where exposed.
2. Provide struck joints for exterior joints below grade.

3. Provide raked joints, uniform 3/4” deep, where sealant is indicated.
4. Provide flush joints for other locations.
5. Tool joints when mortar is thumb-print hard.

END OF SECTION

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Structural steel framing members, base plates, and miscellaneous structural steel and as defined in Section 2 of American Institute of Steel Construction (AISC) “Code of Standard Practice for Steel Buildings and Bridges.”

1.2 SUBMITTALS

A. Submit shop drawings for fabrication and erection of structural steel.
   1. Indicate member sizes, dimensions and finish.
   2. Include details of cuts, connections, holes and all other pertinent data.
   3. Include erection elevations and details wherever applicable.
   4. Indicate welded connections using standard AWS welding symbols. Indicate net weld lengths.

B. Submit product data for:
   1. Shop paint.
   2. Grout.

1.3 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC -“Specifications for Design, Fabrication and Erection of Structural Steel for Buildings”, including commentary and supplements, for the design, fabrication and erection of structural steel. This standard is heretofore referred to as “AISC Specifications”.

B. Comply with AISC “Code of Standard Practice for Steel Buildings and Bridges”, for design, fabrication and erection of structural steel.
   1. Paragraph 4.2.1 of the AISC Code of Standard Practice is modified by the deletion of the following sentence: “ This approval constitutes the Owner’s acceptance of all responsibility for the design adequacy of any connections designed by the fabricator as a part of his preparation of these shop drawings.”

C. Comply with American Welding Society (AWS) D1.1-84, “Structural Welding Code” for welding materials and processes, and for qualification of welding operators.

D. Perform design under direct supervision of a Professional Structural Engineer licensed in

the State of Tennessee.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Structural Steel Members: ASTM A36.

B. Structural Tubing: ASTM A501.

C. Steel Pipe: ASTM A53, Grade B, Schedule 40.

D. Bolts, Nuts, and Washers:
1. Standard Threaded Fasteners: ASTM A307, Grade A. Provide hexagonal heads and nuts for exposed connections.
2. High Strength Fasteners: ASTM A325. Provide direct tension indicator washers.

E. Anchor Bolts: ASTM A307.

F. Welding Materials: AWS D1.1; type required for materials being welded.
Welded headed studs: AWS D.1.1, Chapter 4, Part F.

G. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at 28 days.

H. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.

I. Bituminous Coating: SSPC Paint 12.

2.2 FABRICATION

A. Fabricate in accordance with AISC Specifications, unless indicated otherwise.

B. Weld shop connections.

C. Bolt field connections, except where welded connections are indicated. Provide high-strength threaded fasteners for principal bolted connections.

2.3 FINISH

A. Prepare structural component surfaces in accordance with SSPC SP 1 Solvent cleaning.

B. Prior to painting, clean surfaces of rust, scale and foreign matter and in accordance with SSPC SP3 Power Tool Cleaning.

C. Shop prime structural steel members. Acceptable manufacturer's include:
   1. Tnemec Company, Inc.
   2. Southern Coatings, Inc.
   3. Sherwin Williams Company

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Clean concrete and masonry bearing surfaces and roughen to improve bond. Clean bottom surfaces of base and bearing plates.

C. Coat surfaces in contact with earth, masonry and concrete with bituminous coating.

3.2 ERECTION

A. Allow for erection loads. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment and removal of paint on surfaces adjacent to field welds.

B. Erect structural steel in accordance with AISC Code of Standard Practice.

C. Level and plumb members with AISC specified tolerances.

D. Splice members only where indicated on shop drawings.

E. Field weld components indicated on Drawings.

F. Do not field cut or alter structural members without approval of Architect/Engineer. Do not enlarge unfair holes by burning or using drift pins. Do not use cutting torches for correcting fabrication errors.

G. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.3 FIELD QUALITY CONTROL

A. Perform testing and inspection services.
   1. Perform visual inspection of all shop and field welds.

2. Inspect shop and field bolted connections in accordance with AISC specifications.
3. Test high-strength bolts by “turn-of-nut” method.

3.4 ADJUSTING AND CLEANING

A. Touch-up field welds, bolted connections and abraded areas of shop paint with field coat of same material used for shop painting.

END OF SECTION

SECTION 05 51 13

METAL PAN STAIRS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Structural steel stair framing and supports.

B. Pan treads to receive concrete fill and landings.

1.2 RELATED SECTIONS

A. Section 033000 - Cast-In-Place Concrete.

B. Section 066000 – Plastic Fabrications.

C. Section 099100 - Painting.

1.3 REFERENCES

A. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 1996.

B. ASTM A 53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 1996.

C. NAAMM AMP 510 - Metal Stairs Manual; The National Association of Architectural Metal Manufacturers; 1992.

D. SSPC (PM2) - Painting Manual, Vol. 2, Systems and Specifications; Steel Structures Painting Council; 1995.

1.4 DESIGN REQUIREMENTS

A. Design and fabricate stair assembly to support a uniform live load of 100 lb/sq ft and a concentrated load of 300 lb/sq ft with deflection of stringer or landing framing not to exceed 1/180 of span. Test in accordance with ASTM A 935.

B. Design and fabricate railing assemblies in accordance with ASTM E 985.

C. Design railing assemblies, wall rails, and attachments to resist lateral force of 200 lbs at any point without damage or permanent set. Test in accordance with ASTM A 935.

D. Fabricate stair assembly to NAAMM Metal Stairs Manual, Class Architectural.

1.5 SUBMITTALS

A. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

1.6 QUALITY ASSURANCE

A. Perform design and prepare shop drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at the place where the Project is located.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Sections: ASTM A 36/A 36M.

B. Steel Tubing: ASTM A 500, Grade B.

C. Steel Plates: ASTM A 283.

D. Pipe: ASTM A 53, Grade B Schedule 40, black finish.

E. Ungalvanized Steel Sheet: ASTM A 611, Grade C.

F. Checkered Plate: ASTM A 786/A 786M, rolled steel floor plate.

G. Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M) galvanized to ASTM A 153/A 153M for galvanized components.

H. Welding Materials: AWS D1.1; type required for materials being welded.

I. Shop and Touch-Up Primer: SSPC-Paint 15, Type 1, red oxide.

2.2 COMPONENTS

A. Metal Pan Stair Treads: Concrete in metal pan; smooth surface; non-slip edge.

B. Concrete: Type specified in Section 03300.

2.3 FABRICATION - GENERAL

A. Fit and shop assemble components in largest practical sections, for delivery to site.

B. Fabricate components with joints tightly fitted and secured.

C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

F. Fabricate components accurately for anchorage to each other and to building structure.

2.4 FABRICATION - PAN STAIRS AND LANDINGS

A. Construct stairs to conform to sizes and arrangement shown.

B. Size structural members and connections to adequately support specified design loads.

C. Fabricate wall stringers of channel having 1-1/2” width. Fabricate open well stringers of tubing, having 2” width and same depth as wall stringer.

D. Locate stringers to form base 2” high above stair nosing and landings. Close exposed ends of stringers.

E. Fabricate treads, risers, and platforms of cold-rolled steel or hot-rolled steel, at fabricator’s option. Provide thickness of metal and reinforcing as required to adequately support specified design loads.

F. Fabricate rails and guards of steel pipe and tubing, sizes as indicated.

2.5 FINISHING

A. Prepare surfaces to be primed in accordance with SSPC SP 2.

B. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

C. Do not prime surfaces in direct contact with concrete or where field welding is required.

D. Prime paint items with one coat.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete and embedded in masonry with setting templates.

3.3 INSTALLATION

A. Install components plumb and level, accurately fitted, free from distortion or defects.

B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.

C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

D. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.4 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 05 52 13

PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Steel pipe handrails, balusters, and fittings.

B. Steel tube handrails, balusters, and fittings.

1.2 RELATED SECTIONS

A. Section 033000 - Cast-In-Place Concrete.

B. Section 099100 - Painting.

1.3 REFERENCES

A. ASTM A 53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 1996.

B. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 1993.

C. ASTM E 935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 1993.

D. ASTM E 985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 1996.

E. SSPC (PM2) - Painting Manual, Vol 2; Steel Structures Painting Council; 1995.

1.4 DESIGN REQUIREMENTS

A. Design railing assembly, wall rails, and attachments to resist a concentrated lateral load applied at any point and in any direction of 200 lbs.

B. Design railing assembly, wall rails, and attachments to resist a uniform load applied in any direction of 50 plf.

C. Design guardrail assemblies to resist a load of 50 plf applied horizontally at the required guardrail height and a simultaneous load of 100 plf applied vertically downward at the top of the guardrail.

D. Design guardrail assemblies to resist a 200 lb concentrated horizontal load applied on a 1 ft. square area at any point in the system including intermediate rails or other elements serving this purpose.

E. Test in accordance with ASTM E 935.

1.5 SUBMITTALS

A. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

PART 2 -PRODUCTS

2.1 STEEL RAILING SYSTEM

A. Steel Tubing: ASTM A 500, Grade B.

B. Pipe: ASTM A 53, Grade B Schedule 40, primed finish.

C. Fittings: Elbows, T-shapes, wall brackets, escutcheons; cast steel.

D. Mounting: Adjustable Brackets and flanges. Prepare backing plate for mounting in metal stud with wood blocking wall construction.

E. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.

F. Shop and Touch-Up Primer: SSPC-Paint 15, Type 1, red oxide.

2.3 FABRICATION

A. Fit and shop assemble components in largest practical sizes for delivery to site.

B. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

C. Provide anchors and plates required for connecting railings to structure.

D. Exposed Mechanical Fastenings: Provide flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

F. Interior Components: Continuously seal joined pieces by intermittent welds and plastic filler.

G. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

H. Accurately form components to suit specific project conditions and for proper connection to building structure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects.

C. Anchor railings securely to structure.

D. Field weld anchors as indicated on drawings. Touch-up welds with primer. Grind welds smooth.

E. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

F. Assemble with spigots and sleeves to accommodate tight joints and secure installation.

3.4 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 06 05 73

WOOD TREATMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Site applied termiticide for wood materials.

B. Site applied termiticide for other building materials.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete.

B. Section 06 10 00 - Rough Carpentry: Factory treatment for wood products.

C. Section 06 15 00 - Wood Decking: Factory treatment for wood products.

D. Section 06 17 33 - Wood I-Joists: Factory treatment for wood products.

E. Section 06 17 53 - Shop-Fabricated Wood Trusses: Factory treatment for wood products.

F. Section 06 18 00 - Glued-Laminated Construction: Factory treatment for wood products.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.

C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

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.

B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

1.05 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for applied materials.

PART 2 PRODUCTS

2.01 SITE APPLIED WOOD TREATMENT

A. Site Applied Termiticide for Wood: Borate mineral salt based, spray applied, penetrating termiticide.

B. Site Applied Termiticide for Wood, Steel and Concrete: Borate mineral salt based, spray applied termiticide formulated for use on wood, steel, concrete and other building materials.
   1. Active Ingredient: 40% minimum disodium octaborate tetrahydrate (DOT).
   2. Carrier and Penetrant: Proprietary glycol solution.

PART 3 EXECUTION

3.01 PREPARATION

A. Remove dust, dirt and other contaminants from treatment surfaces. Remove tarpaulins, dropcloths, strippable protective films, etc., from areas to be treated Move equipment and stored materials that block or prevent product application.

3.02 INSTALLATION - GENERAL

A. Provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 SITE APPLIED WOOD TREATMENT

A. Comply with manufacturers written mixing and installation instructions.

B. Termiticide: Apply to foundations, structure and other items as listed.
   1. All structural wood and sill plates within 24 inches (610 mm), minimum, of point of contact with foundation.
   2. All wood, wood based and cellulosic sheathing within 24 inches (610 mm), minimum, of point of contact with foundation.
   3. Concrete foundations 2 inches (51 mm), minimum, from sill plate.
   4. All pipe and plumbing penetrations up to 24 inches (305 mm), minimum, above slab and slab surface within 6 inches (152 mm), minimum, of pipe or penetration.
   5. Concrete or masonry basement walls up to 24 inches (610 mm), minimum, from top of soil.

END OF SECTION

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Wood furring, grounds, nailers, and blocking.

B. Sheathing.

C. Wood Treatment.

1.2 RELATED SECTIONS

A. Section 031000 – Concrete Forming.

B. Section 062000 – Finish Carpentry.

C. Section 064000 – Architectural Woodwork.

1.3 DEFINITIONS

A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise specified.

B. Exposed Framing: Dimension lumber not concealed by other construction and indicated to receive a stained or natural finish.

1.4 SUBMITTALS

A. Submit Product Data for the following:
   1. Underlayment.
   2. Sheathing.
   3. Air-infiltration barriers.
   4. Construction adhesives.

B. Material certificates for dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved b the American Lumber Standards Committee's (ALSC) Board of Review.

C. Wood treatment data as follows, including chemical treatment manufacturer's instructions for handling, storing, installing, and finishing treated materials.
   1. For each type of preservative-treated wood product, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
   2. For waterborne-treated products, include statement that moisture content of treated materials was reduced to levels indicated before shipment to Project site.
   3. For fire-retardant-treated wood products, include certification by treating plant that treated materials comply with specified standard and other requirements as well as data relative to bending strength, stiffness, and fastener-holding capacities of treated materials.

D. Material test reports from a qualified independent testing agency indicating and interpreting test results relative to compliance of fire-retardant-treated wood products with requirements indicated.

E. Warranty of chemical treatment manufacturer for each type of treatment.

1.5 QUALITY ASSURANCE

A. Factory-mark each piece of lumber with type, grade, mill and grading agency.

B. Perform Work in accordance with the following agencies:
   1. Lumber Grading Agency: Certified by ALSC.
   2. Plywood Grading Agency: Certified by APA.

C. Where indicated as treated wood, provide lumber bearing American Wood Preservers Bureau (AWPB) Quality mark.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.
   1. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers:
   1. Wood-Preservative-Treated Materials:
      a. Baxter: J. H. Baxter Co.
      b. Chemical Specialties, Inc.
      c. Continental Wood Preservers, Inc.
      d. Hickson Corp.
      e. Hoover Treated Wood Products, Inc.
      f. Osmose Wood Preserving, Inc.
   2. Fire-Retardant-Treated Materials, Interior Type A.
      a. Baxter: J. H. Baxter Co.
      b. Chemical Specialties, Inc.
      c. Continental Wood Preservers, Inc.
      d. Hickson Corp.
      e. Hoover Treated Wood Products, Inc.

   3. Fire-Retardant-Treated Materials, Exterior Type:
      a. American Wood Treaters, Inc.
      b. Hoover Treated Wood Products, Inc.

2.2 LUMBER, GENERAL

A. Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.

B. Inspection Agencies: Inspection Agencies, and the abbreviations used to reference them, include the following:
   1. NELMA – Northeastern Lumber manufacturers Association.
   2. NLGA – National Lumber Grades Authority (Canadian).
   3. RIS – Redwood Inspection Service.
   4. SPIB – Southern Pine Inspection Bureau.
   5. WCLIB – West Coast Lumber Inspection Bureau.
   6. WWPA – Western Wod Products Association.

C. Plywood: Comply with product Standard PS1-74 or American Plywood Association "Plywood Design Specification".

D. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
   1. For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece, or omit grade stamps and provide grade-compliance certificates issued by inspection agency.

E. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
   1. Provide dressed lumber, S4S, unless otherwise indicated.
   2. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.
   3. Provide lumber with 15 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

A. General: Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPA C2 (lumber) and AWPA C9 (plywood). Mark each treated item with the Quality mark Requirements of an inspection agency approved by ALSC's Board of Review.
   1. Do not us chemicals containing chromium or arsenic.
   2. For exposed items indicated to receive stained finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

B. Pressure treat above ground items with waterborne preservatives to a minimum retention of 0.25 lb/cu. ft. After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively. Treat indicated items and the following:
   1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
   2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
   3. Wood framing members less than 18 inches above grade.
   4. Wood floor plates installed over concrete slabs directly in contact with earth.

C. Pressure treat wood members in contact with ground or freshwater with waterborne preservatives to a minimum retention of 0.40 lb/cu. ft.

D. Complete fabrication of treated items before treatment, where possible. If cut after treatment, apply field treatment complying with AWPA M4 to cut surfaces. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

2.4 DIMENSION LUMBER

A. General: provide dimension lumber of grades indicated according to the ALSC national Grading Rule (NGR) provisions of the inspection agency indicated.

B. Framing other than Non-Load-Bearing Partitions: Provide framing of the following grade and species.
   1. Grade: Construction or No. 2.
   2. Species: Southern Pine; SPIB.

C. Other Framing Not Listed Above: Provide the folowing grades and species:
   1. Grade: Construction or No. 2.
   2. Species: Southern Pine; SPIB.

2.5 BOARDS

A. Concealed Boards: Where boards will be concealed by other work, provide lumber with 19 percent maximum moisture content and of following species and grade.

2.6 MISCELLANEOUS LUMBER

A. General: provide lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.

B. Fabricated miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.

C. Moisture Content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.

D. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGR's of any species. For board-size lumber, provide No. 3 Common grade per NELMA, NLGA, or WWPA; No. 2 grade per SPIB; or Standard grade per NLGA, WCLIB or WWPA of any species.

2.7 ROOF SHEATHING

A. Plywood Roof Sheathing: Provide sheathing to comply with the following standards or as indicated on Drawings.
   1. APA rated sheathing.
   2. Exposure durability classification: Exposure 1.
   3. Span rating: 32/16.

4. Thickness: 5/8”.

2.8 STRUCTURAL-USE PANELS FOR BACKING

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

2.9 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of Type 304 stainless steel.

B. Nails, Wire, Brads, and Staples: FS FF-N-105.

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

D. Wood Screws: ASME B18.6.1.

E. Lag Bolts: ASME B18.2.1. (ASME B18.2.3.8M)

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

2.10 MISCELLANEOUS MATERIALS

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

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

C. Water-Repellent Preservative: NWWDA-tested and accepted formulation containing 3-iodo-2-propynyl butyl carbonate (IPBC) as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Discard units of material with defects that impair quality of rough carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.

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

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

D. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.

E. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
   1. CABO NER-272 for power-driven staples, P-nails, and allied fasteners.
   2. Published requirements of metal framing anchor manufacturer.
   3. "Recommended Nailing Schedule" of referenced standard and with AFPA's "National Design Specifications for Wood Construction."
   4. "Table 1705.1 – Fastening Schedule," of the Standard Building Code.

F. Use common wire nails, unless otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; predrill as required.

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

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

3.2 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

A. Install wood grounds, nailers, blocking, and sleepers where shown and where required for screeding or attaching other work. Form to shapes shown and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

C. Install permanent grounds of dressed, preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FRAMING GENERAL

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

B. Install framing members of size and at spacing indicated.

C. Do not splice structural members between supports.

END OF SECTION

SECTION 06 17 53

SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Pre-engineered wood trusses.

1.2 RELATED SECTIONS

A. Section 061000 – Rough Carpentry.

1.3 REFERENCES

A. NfoPA (National Forest Products Association) – National Design Specification for Wood Construction.

B. Truss Plate Institute – Design Specification for Metal Plate Connected Wood Trusses.

1.4 QUALITY ASSURANCE

A. Lumber used in the manufacture of concealed trusses; grade stamp clearly visible, indicating conformance with NfoPA.

B. Truss vendor shall be certified by the Truss Plate Institute.

1.5 SUBMITTALS

A. Submit shop drawings indicating truss framing plans, species and grades of lumber used; design loading and allowable stress increase; force analysis of each member; pitch, span and spacing of trusses; gage thickness, nominal sizes and locations of connectors at joints; bearing and anchorage details; framed openings; permanent bracing and bridging.

B. Submit manufacrturer's installation instructions on lateral bracing.

C. Truss submittals shall bear the stamp of a registered professional structural engineer licensed and in good standing in the state where the work is performed.

D. DO NOT cut, notch or otherwise modify wood trusses without written approval from the

architect or engineer. Overhanging truss chords may be cut to length as required to produce required roof line.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concealed Wood Trusses:
1. Wood Chords and Webs: PS 20, graded to NoFPA rules. No. 2 Southern Yellow Pine, maximum moisture content, 19 percent.
2. Plates: 20 gage galvanized sheet steel, minimum yield strength of 33 ksi minimum ultimate tensile strength of 48 ksi, 1.25 oz. Zinc coating in accordance with ASTM A90.

B. Framing Connectors: Minimum 18 gage galvanized steel, type as required for specific use.

2.2 FABRICATION

A. Ensure members are accurately cut to length, angle, and true to line, to ensure tight joints.

PART 3 - EXECUTION

3.1 ERECTION

A. Set and secure wood trusses level, plumb, and in correct locations.

B. Provide temporary bracing and anchorage to hold trusses in place until permanently secured.

C. Ensure truss ends have sufficient bearing area.

D. Install permanent bracing and bridging prior to application of loads.

E. Cutting and altering of members is not permitted.

END OF SECTION

SECTION 06 20 00

FINISH CARPENTRY

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Finish carpentry items, other than shop prefabricated casework; hardware and attachment accessories.

1.2 RELATED SECTIONS

A. Section 06 10 00 – Rough Carpentry.

B. Section 06 40 00 – Architectural Woodwork.

C. Section 09 91 00 – Painting.

1.3 REFERENCES

A. Architectural Woodwork Institute (AWI) " Quality Standards, Guide Specifications and Quality Certification Program" Fifth Edition, 1988, is used as reference standard for quality grade, workmanship, and grade of material.
   1. This standard is referred to as " AWI Quality Standards".

B. Architectural Woodwork Institute (AWI) "Wood Moldings" is used as a reference standard for molding profile indication on the drawings.

1.4 QUALITY ASSURANCE

A. Comply with applicable portions of "AWI Quality Standards" for quality of workmanship and grade of material.

B. Submit, or include on shop drawings, fabricator's certificate that architectural woodwork complies with the specified AWI quality grade.
   1. Submit under provisions of Section 01400.

1.5 SUBMITTALS

A. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, finishes, and accessories.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials in ventilated interior locations under constant minimum temperature of 60 degrees F and maximum relative humidity of 55 percent.

B. When project conditions are acceptable, store wood items in area of installation.
   1. Allow items to become acclimated to heat and humidity of installation area before installation.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS

A. Wood Trim: Premium Grade White Pine.

B. Comply with Section 700 of AWI Quality Standards.

C. Use aliphatic- or phenolic-resin wood glue recommended by manufacturer for general carpentry use.

2.2 ACCEPTABLE MANUFACTURERS

A. Shelving Hardware:
   1. Knape & Vogt Mfg. Co.
   2. Stanley Hardware.

B. No substitutions except under provisions of Section 016000.

2.3 CLOSET AND STORAGE SHELVING

A. Comply with Section 600 of AWI Quality Standards.

B. Quality: Custom grade, in accordance with AWI Quality Standards.

C. Shelving: AWI Grade III hardwood plywood for opaque finish.
   1. Plastic “T” edge is not acceptable.

2.4 SHELVING HARDWARE

A. Models as follow, manufactured by Knape & Vogt, or equivalent by other acceptable manufacturer.

B. Wall Mounted Adjustable Shelves:
   1. Standards: KV87.
   2. Brackets: KV187LL, length to match shelf depth.

2.5 COAT HOOKS

A. Coat Hooks: No. 572, manufactured by Ives.

2.6 ACCESSORIES

A. Nails and Fasteners: Size and type to suit application.

B. Sealer: Alkyd primer-sealer.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Verify adequacy of backing and support framing.

B. Apply one coat of sealer to concealed surfaces and surfaces in contact with cementitious materials.
   1. Brush apply only.

3.2 INSTALLATION

A. Install work in accordance with AWI Quality Standards.

B. Set and secure materials and components in place, rigid, plumb, and level.

C. Scribe and cut work to fit adjoining work. Refinish cut surfaces or repair damaged finish at cuts.

D. Counter-sink anchorage devices at exposed locations and conceal with solid plugs of species to match surrounding wood. Finish flush with surrounding surfaces.

E. Install to a tolerance of 1/8” in 8 ft. for plumb and level; and with 1/16” maximum offset in flush adjoining surface, 1/8” maximum offsets in revealed adjoining surfaces.

END OF SECTION

SECTION 06 40 00

ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Laminate Clad Casework.

B. Plastic Laminate Material Tops.

1.2 RELATED SECTIONS

A. Section 061000 – Rough Carpentry.

B. Section 062000 – Finish Carpentry.

C. Section 099100 – Painting.

1.3 REFERENCES

A. Architectural Woodwork Institute (AWI) “Quality Standards, Guide Specifications and Quality Certification Program” Fifth Edition, 1988, is used as reference standard for quality grade, workmanship, and grade of material, and factory finish system. This standard is referred to as “AWI Quality Standards”.

B. AWI “Architectural Casework – General Details and Specification Guide” is used as a reference standard for casework design. This standard is referred to as “AWI Architectural Casework”.

1.4 QUALITY ASSURANCE

A. Comply with applicable portions of “AWI Quality Standards”, for quality of workmanship and grade of material.

B. Comply with “AWI Architectural Casework” for casework design and construction details.

C. Submit on shop drawings, fabricator’s certification that architectural woodwork complies with the specified AWI quality grade.

1.5 SUBMITTALS

A. Submit product data for the following:
   1. Cabinet Hardware.
   2. Sealer.

B. Submit shop drawings for fabrication and erection of casework.
   1. Include dimensioned plans and elevations, using same reference to room numbers as those on Contract Documents.
   2. Include materials, component profiles, fastening methods, assembly methods, joint details, accessory listings, and schedule of finishes.

C. Submit samples of plastic laminate for color selection.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect woodwork during transit, delivery, storage, and handling to prevent damage, soiling, and deterioration.

B. Do not deliver woodwork, until painting, wet work, grinding, and similar operation which could damage, soil, or deteriorate woodwork have been completed in installation areas.

C. When project conditions are acceptable, store materials in area of installation.
   1. Allow materials to become acclimated to heat and humidity of area before installation.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Plastic Laminate:
   1. Wilson Art
   2. Nevamar Corporation.
   3. Formica Corporation.

B. Drawer Slides:
   1. Knape & Vogt.
   2. Grant Hardware Co.
   3. Hafele.

C. Casework Door Hinges:
   1. Stanley Hardware.
   2. Grass America, Inc.
   3. Hafele.

D. Casework Door and Drawer Pulls:
   1. Stanley Hardware.
   2. Builders Brass.
   3. Hafele.

E. Casework Shelf Standards and Supports:
   1. Knape & Vogt.
   2. Stanley Hardware.
   3. Hafele.

F. Casework Door and Drawer Locks:
   1. Corbin Cabinet Lock.

2.2 CASEWORK

A. Comply with Sections 400 and 400B of AWI Quality Standards.

B. Quality: Custom grade, in accordance with AWI Quality Standards.

C. Construction: Flush Overlay, in accordance with AWI Architectural Casework.

D. Materials for plastic laminate finish:
   1. Provide materials for laminate-clad finish.
   2. Exposed Surfaces: High-pressure plastic laminate, Grade 1, color as selected by Architect.
   3. Semi-exposed Areas: As governed by specified AWI quality grade.

E. Materials for wood casework:
   1. Provide materials for opaque finish.
   2. Exposed Solid Wood Parts: As governed by specified AWI quality grade.
   3. Exposed Panel Parts: Medium density overlay.

E. Hardware:
   1. Hinges: Stanley 1501-2 for Flush Overlay.
   2. Drawer Slides: K&V 1294.
   3. Door and Drawer Pulls: recessed pull, US26D finish.
   4. Locks: Corbin 0666-1/2 for drawers and 0737 for doors, US26D finish.
   5. Shelf Standards: K&V 255.
   6. Shelf Supports: K&V 256.

2.3 PLASTIC LAMINATE TOPS

A. Comply with Section 400C of AWI Quality Standards.

B. Quality: Custom grade in accordance with AWI Quality Standards.

C. Materials:
   1. Core: Marine-grade plywood at sink location, exterior-grade plywood at other locations or as indicated on Drawings.
   2. Overlay Panels: High-pressure plastic laminate, Grade 1, solid colors as selected.
   3. Provide backing sheet for each top.
   4. Plastic edge banding. Color selected by architect from manufacturer's standard colors.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Prime paint surfaces of items or assemblies in contact with cementitious materials, before installation.

B. All surfaces to be laminated are to be inspected to determine that they are sound, clean and free of surface defects.

C. Verify adequacy of backing and support framing.

D. Seal surfaces in contact with cementitious material.

E. Seal concealed surfaces. Brush apply only.

F. Prime exposed surfaces.
   1. Before application of primer, sand with 150 grit sandpaper to remove handling marks and raised grain.

3.2 INSTALLATION

A. Install work in accordance with AWI Premium Quality Standard.

B. Set and secure materials and components in place, rigid, plumb, and level.

C. Scribe and cut work to fit adjoining work. Refinish cut surfaces or repair damaged finish at cuts.

D. Counter-sink anchorage devices at exposed locations and conceal with solid plugs of species to match surrounding wood. Finish flush with surrounding surfaces.

E. Install to a tolerance of 1/8” in 8 ft. for plumb and level; with 1/16” maximum offset in flush adjoining surface, 1/8” maximum offsets in revealed adjoining surfaces. Embed backsplashes on countertops in full bed of sealant.

F. Adjust doors, drawers, and hardware as required to function correctly

G. Thoroughly clean all casework, hardware, and fittings.

END OF SECTION

SECTION 06 60 00

PLASTIC FABRICATIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Plastic architectural decorative fabrications.

B. Cellular pvc trim boards for corner boards, soffits, fascias, battens, door pilasters, frieze boards, rake boards, architectural millwork and door/window trim.

C. Plastic handrails.

1.2 RELATED SECTIONS

A. Section 074633 – Vinyl Siding.

1.3 REFERENCES

A. ASTM D792 - Density and Specific Gravity of Plastics by Displacement.

B. ASTM D570 - Water Absorption of Plastics.

C. ASTM D638 - Tensile Properties of Plastics.

D. ASTM D790 - Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

E. ASTM D1761 - Mechanical Fasteners in Wood.

F. ASTM D5420 - Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by means of a Striker Impacted by a Falling Weight.

G. ASTM D256 - Determining the Pendulum Impact Resistance of Plastics.

H. ASTM D696 - Coefficient of Linear Thermal Expansion of Plastics Between -30˚C and 30˚C with a Vitreous silica Dilatometer.

I. ASTM D635 - Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.

J. ASTM E84 - Surface Burning Characteristics of Building Materials.

K. ASTM D648 - Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position.

L. ASTM D3679 - Standard Specification for Rigid Poly Vinyl Chloride (PVC) Siding.

1.4 SUBMITTALS

A. Product Data: Submit product data, manufacturer's catalogs, SPEC-DATA ® product sheet, for specified products.

B. Samples: Submit three material samples representative of the texture, thickness and widths
shown and specified herein.

1.5 QUALITY ASSURANCE

A. Workmanship, Finish, and Appearance:
1. Free foam cellular pvc that is homogeneous and free of voids, holes, cracks, and foreign inclusions and other defects. Edges must be square and top and bottom surfaces shall be fiat with no convex or concave deviation.
2. Uniform surface free from cupping, warping, and twisting.

1.6 DELIVERY, STORAGE AND HANDLING

A. Trim materials should be stored on a flat and level surface on a full shipping pallet. Handle materials to prevent damage to product edges and corners. Store materials under a protective covering to prevent jobsite dirt and residue from collecting on the boards.

1.7 WARRANTY

A. Provide manufacturer's 25 year warranty against defects in manufacturing that cause the products to rot, corrode, delaminate, or excessively swell from moisture.

PART 2 - PRODUCTS

2.1 MATERIALS – TRIM

A. Basis of Design products: AZEK® Trimboards manufactured by Vycom Corporation.

B. Material: Free foam cellular pvc material with a small-cell microstructure and density of .55 grams/cm3.
   1. Material shall have a minimum physical and performance properties specified in Section 2.1.C.

C. Performance and physical characteristic requirements:

PROPERTY	UNITS	VALUE	ASTM METHOD
PHYSICAL			
Density	g/cm3	0.55	D 792
Water Absorption	%	0.15	D 570
MECHANICAL			
Tensile Strength	psi	2256	D 638
Tensile Modulus	psi	144,000	D 638
Flexural Strength	psi	3329	D 790
Flexural Modulus	psi	144,219	D 790
Nail Hold	Lbf/in of penetration	35	D 1761
Screw Hold	Lbf/in of penetration	680	D 1761
Staple Hold	Lbf/in of penetration	180	D 1761
Gardner Impact	in-lbs	103	D 5420
Charpy Impact (@23˚C)	ft-lbs	4.5	D 256
THERMAL			
Coef. of Linear Expansion	in/in/˚F	3.2 x 10-5	D 696
Burning Rate	in/min	No burn when	D 635
		flame removed	
Flame Spread Index	--	25	E 84
Heat Defl. Temp 264 psi	˚F	150	D 648
Oil Canning (@140˚F)	˚F	Passed	D 648

D. Accessory Products:
   1. Fasteners:
      a. Use fasteners designed for wood trim and wood siding (thinner shank, blunt point, full round head) with AZEK®
      b. Use a highly durable fastener such as stainless steel or hot-dipped galvanized.
      c. Staples, small brads and wire nails must not be used as fastening members.
      d. The fasteners should be long enough to penetrate the solid wood substrate a minimum of 1 1/2”.

e. Standard nail guns work well with AZEK trim products.
f. Use 2 fasteners per every framing member for trimboards applications. Trimboards 12” or wider, as well as sheets, will require additional fasteners.
g. Fasteners must be installed no more than 2” from the end of each board.
h. AZEK should be fastened into a flat, solid substrate. Fastening AZEK into hollow or uneven areas must be avoided.
i. Pre-drilling is typically not required unless a large fastener is used or product is installed in low temperatures.
j. 3/8” and 1/2” sheet product is not intended to be ripped into trim pieces. These profiles must be glued to a substrate and mechanically fastened.

2. Adhesives:
a. Glue all AZEK to AZEK joints such as window surrounds, long fascia runs, etc. with AZEK Adhesive, a cellular pvc cement, to prevent joint separation.
b. The glue joint should be secured with a fastener and/or fastened on each side of the joint to allow adequate bonding time.
c. AZEK Adhesive has a working time of 10 minutes and will be fully cured in 24 hours.
d. If standard pvc cements are used, keep in mind these products typically cure quickly which will result in limited working time and may reduce adhesive strength.
e. Surfaces to be glued should be smooth, clean and in complete contact with each other.
f. To bond AZEK to other substrates, various adhesives may be used. Consult adhesive manufacturer to determine suitability.

3. Sealants:
a. Use urethane, polyurethane or acrylic based sealants without silicone

E. Finishes:
1. AZEK products do not require paint for protection, but may be painted to achieve a custom color.
2. Preparation:
a. No special surface preparations are required prior to painting - sanding is not necessary for paint adhesion.
b. Surface must be clean and dry.
c. If desired, nail holes may be filled with polyurethane or acrylic based caulk.
d. Use a 100% acrylic latex paint with a Light Reflective Value (LRV) of 55 or higher.
e. Follow the paint manufacturer’s recommendations to apply.

2.2 MATERIALS – DECORATIVE ELEMENTS

A. Basis of Design products:
   1. Pagliacco Turning & Milling.
      a. PVC square tapered craftsman column, plain shaft. Size: 16” > 12” x 5’.
   2. Wholesale Millwork.
      a. Bracket (plain), small post, urethane. Size: 18” H x 3 ½” W x 16” projection.
      b. Bracket (Victorian): #PB-26. Size: 16” H x 12 ¼” projection.
      c. PVC non-tapered plain column wrap. Size: 8” x height as indicated on Drawings.
      d. Column Caps and Bases, Victorian Style. #CW8CC1VC, #CW8CB1VC. 8” W.
      e. Gable Decoration: #GD-D. Size: As indicated on Drawings.

B. Material: Free foam cellular pvc material with a small-cell microstructure and density of .55 grams/cm3.
   1. Material shall have a minimum physical and performance properties specified in Section C on the following page.

C. Performance and physical characteristic requirements:

PROPERTY	UNITS	VALVE	ASTM METHOD
PHYSICAL			
Density	g/cm^3	0.55	D 792
Water Absorption	%	0.15	D 570
THERMAL			
Coefficient of Linear Expansion	in/in/*F	3.2 x 10-5	D 696
Burning Rate	in/min	No Burn when Flame removed	D 635
Flame Spread Index	--	25	E 84
Heat Deflection Tem 264 psi	°F	150	D 648
Oil Canning (@140°F)	°F	Passed	D 648

D. Accessory Products:
   1. Fasteners:
      a. Use fasteners designed for wood trim and wood siding (thinner shank, blunt point, full round head).
      b. Use a highly durable fastener such as stainless steel or hot-dipped galvanized.
      c. Staples, small brads and wire nails must not be used as fastening members.
      d. The fasteners should be long enough to penetrate the solid wood

substrate a minimum of 1 1/2".

e. Standard nail guns work well with trim products.

f. Fasten into a flat, solid substrate. Fastening into hollow or uneven areas must be avoided.

g. Pre-drilling is typically not required unless a large fastener is used or product is installed in low temperatures.

2.. Adhesives:

a. Glue all joints such as window surrounds, long fascia runs, etc. with adhesive, a cellular pvc cement, to prevent joint separation.

b. The glue joint should be secured with a fastener and/or fastened on each side of the joint to allow adequate bonding time.

c. If standard pvc cements are used, keep in mind these products typically cure quickly which will result in limited working time and may reduce adhesive strength.

d. Surfaces to be glued should be smooth, clean and in complete contact with each other.

e. To bond to other substrates, various adhesives may be used. Consult adhesive manufacturer to determine suitability.

3. Sealants:

a. Use urethane, polyurethane or acrylic based sealants without silicone.

E. Finishes:

1. Preparation:

a. No special surface preparations are required prior to painting - sanding is not necessary for paint/adhesion.

b. Surface must be clean and dry.

c. If desired, nail holes may be filled with polyurethane or acrylic based caulk.

d. Use a 100% acrylic latex paint with a Light Reflective Value (LRV) of 55 or higher.

e. Follow the paint manufacturer's recommendations to apply.

2.3 MATERIALS - HANDRAILS

A. Basis of Design products: AZEK® Premier Rail series manufactured by Vycom Corporation.

B. Submit other manufacturers' equivalents under the provisions of Section 016000.

2.4 MATERIALS – BOARD AND BATTEN

A. Basis of Design products: AZEK® Sheet and Trim manufactured by Vycom Corporation.

B. Submit other manufacturers' equivalents under the provisions of Section 016000.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Manufacturer's instructions:
   1. Comply with manufacturer's product catalog installation instructions and product technical bulletin instructions.

B. Cutting:
   1. Products can be cut using the same tools used to cut lumber.
   2. Carbide tipped blades designed to cut wood work well. Avoid fine tooth metal cutting blades.
   3. Rough edges from cutting may be caused by excessive friction, poor board support, or worn or improper tooling.

C. Drilling
   1. Products can be drilled using the same tools used to drill lumber.
   2. Drilling products is similar to drilling a hardwood. Care should be taken to avoid frictional heat buildup.
   3. Use standard woodworking drills. Do not use drills made for normal rigid pvc.
   4. Periodic removal of shavings from the drill hole may be necessary.

D. Milling
   1. Products can be milled using standard milling machines used to mill lumber.
   2. Relief Angle 20 degress to 30 degrees.
   3. Cutting speed to be optimized with the number of knives and feed rate.

E. Routing
   1. Products can be routed using standard router bits and the same tools used to rout lumber.
   2. Carbide tipped router bits are recommended.

F. Edge Finishing
   1. Edges can be finished by sanding, grinding or filing with traditional woodworking tools.

G. Thermal Expansion and Contraction
   1. Products expand and contract with changes in temperature.

   2. Properly fastening material along its entire length will minimize expansion and contraction.

3. Joints between pieces should be glued to eliminate joint separation.

END OF SECTION

SECTION 07 11 13

BITUMINOUS DAMPPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Bituminous dampproofing.

B. Protection boards.

C. Drainage panels.

1.02 RELATED REQUIREMENTS

A. Section 31 23 23 - Fill.

B. Section 33 46 00 - Subdrainage.

C. Section 07 21 00 - Thermal Insulation: Rigid insulation board used as protection board.

1.03 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.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide properties of primer, bitumen, and mastics.

C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.05 FIELD CONDITIONS

A. Maintain ambient temperatures above 40 degrees F (5 degrees C) 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 (1.5 mm), minimum, wet film.

B. Primers, Mastics, and Related Materials: Type as recommended by dampproofing 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. Apply bitumen per manufacturer's recommendations based on application.

B. Apply from 2 inches (50 mm) below finish grade elevation down to top of footings.

C. Seal items projecting through dampproofing surface with mastic. Seal watertight.

D. Immediately backfill against dampproofing to protect from damage.

END OF SECTION

SECTION 07 21 00

THERMAL INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Thermal batt insulation in wall and roof construction.

B. Perimeter rigid insulation under floor slab.

C. Blowing insulation for open attic areas.

1.2 RELATED SECTIONS

A. Section 033000 – Cast-In-Place Concrete.

B. Section 042200 – Concrete Unit Masonry.

C. Section 061000 – Rough Carpentry.

1.3 REFERENCES

A. ASTM E 84, Test Method for Surface Burning Characteristics of Building Materials.

B. ASTM E 96, Test Method for Water Vapor Transmission of Materials.

C. ASTM E 136, Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.

D. ASTM C 177, Test Method for Steady State Thermal Transmission Properties by means of Guarded Hot Plate.

E. ASTM C 423, Test Method for Sound Absorption and the Sound Absorption Coefficient by the Reverberation Method.

F. ASTM C 518, Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter.

G. ASTM C 553, Standard Specification for Mineral Fiber Blanket and Felt Insulations.

H. ASTM C 612 Standard Specification for Mineral Fiber Block and Board Thermal Insulation.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's product literature, samples and installation instructions for specified insulation.

1.5 DELIVERY

A. Protect insulation from physical damage and from becoming wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage and protection during installation.

B. Label insulation packages to include material name, production date and product code.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers (Batt Insulation):
1. Owens Corning.
2. CertainTeed Corporation.
3. Johns Manville.

B. Manufacturers (Rigid Board Insulation):
1. Owens Corning.
2. The Dow Chemical Company.

C. Manufacturers (Blowing Insulation):
1. CertainTeed Corporation.
2. Johns Manville.

D. Submit other manufacturers' equivalents under the provisions of Section 160000.

2.2 INSULATION MATERIALS

A. Perimeter Insulation: Rigid board 1-1/2" thick extruded polystyrene thermal insulation having a minimum compressive strength of 20 psi, a minimum "R" value of 6.0 at 75 degrees F mean temperature, and a maximum water vapor transmission rate of 0.7 perm-inch, and shall conform to Federal Specifit\cation HH-1-524B, Type II, Class B. Insulation shall be 2.0 pound density Foamular Extruded Polystyrene Insulation as manufactured by V.C. Industries, Chicago , Illinois, Styrofoam SM, or approved substitute, and shall be furnished in boards 8'-0" long by 24" wide.

B. Exterior Cavity Wall Insulation: Rigid board 1" thick extruded polystyrene thermal insulation having a minimum compressive strength of 20 psi, a minimum "R" value of 5.0 at 75 degrees F mean temperature and a maximum water vapor transmission rate of 0.7 perm-inch, and shall conform to Federal Specification HH-I-524B, Type II, Class B. Insulation shall be 2.0 pound density Foamular Extruded Polystyrene Insulation as manufactured by V.C. Industries, Chicago, Illinois, Styrofoam SM, or approved substitute, and shall be furnished in boards 8'-0" long by 16" wide. Miscellaneous batt insulation shall be 6-1/2" thick foil faced fiberglass roll.

1. See Drawings for total cavity wall insulation thickness.

C. Miscellaneous Thermal Batt Roof/Ceiling Insulation (Batt Insulation): ASTM C665, preformed glass fiber batt blanket roll, conforming to the following:

1. Thermal Resistance: R-30.
2. Unfaced.

D. Miscellaneous Thermal Batt Wall Insulation (Batt Insulation): ASTM C665, Kraft faced glass fiber insulation complying with ASTM C665, Type II, Class C, friction fit, conforming to the following:

1. Thermal Resistance: R-19.
2. Width: 16".

E. Thermal Blowing Insulation: Fiber Glass Blowing Insulation. Fiber glass blowing insulation for open attics, enclosed walls, and floor/ceilings assemblies. Complies with ASTM C 764; mineral fiber loose fill insulation Type 1, Pneumatic application:

1. Fire Hazard Classification: ASTM E 84.
    a. Maximum Flame Spread Index: 5.
    b. Maximum Smoke Developed Index: 5.
2. Noncombustibility: ASTM E 136, passes.
3. Open Attic Application:
    a. Thermal Resistance: R of 38. Minimum Installed Thickness: 14.50 inches.

F. Poured fill insulation in cells of exterior concrete block in non-cavity wall construction shall be Zonolite Masonry Insulation as manufactured by W. R. Grace & Co., or approved substitute. Insulation shall meet or exceed Federal Specification for insulation, Thermal (Vermiculite) HH-1-585C, and shall exhibit a "U" value od 0.17 in 8" concrete block when test in accordance with ASTM C-236.

G. All building insulation shall meet the standards established in the most current ASHRAE 90.

2.3 ADHESIVES

A. Adhesive: Type recommended by insulation manufacturer for application.

2.4 ACCESSORIES

A. Insulation Fasteners: Impale clip of galvanized steel, adhered to structural framing.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Examine the areas and conditions under which work of this section will be installed. Verify that adjacent materials are dry and ready to receive insulation. Verify mechanical and electrical services within the ceiling plenum have been tested.

B. Provide written report listing conditions detrimental to performance of work in this section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION - BATT INSULATION

A. Install insulation and vapor retarder in accordance with insulation manufacturer's instructions.

B. Install in roof and ceiling spaces without gaps or voids. Tightly abut batts to prevent thermal leaks.

C. Wire up insulation under roof trusses by running 16 or 18 gauge line wire diagonally or perpendicular to the insulation every 18 to 24 inches.

D. Maintain a minimum 1” ventilation passageway between the roof deck and insulation. Use vent baffle to assure proper clearance where necessary.

3.3 INSTALLATION - PERIMETER INSULATION

A. Install 24” wide strip horizontally at perimeter of concrete slab on grade.
   1. Butt joints tight.
   2. Place on porous fill.

3.4 INSTALLATION – EXTERIOR CAVITY WALL INSULATION

A. Adhere a strip of polyethylene sheet over control joints with beads of Type 2 adhesive.

B. Apply same adhesive to full bed 1/8 inch thick on substrate. Daub adhesive tight to protrusions to ensure continuity of vapor retarder.

C. Install with pads of mastic spaced 12” o.c. both ways.

D. Butt edges and ends tight to adjacent board and to protrusions and stagger end joints.

3.5 INSTALLATION – BLOWING INSULATION

A. Hold the blowing hose parallel to the floor and apply the insulation parallel to the floor rafters to prevent void areas and product compaction against framing members. The material arc length should typically be at least 12 feet when the blowing hose is held horizontal at waist height. Minimize hand cupping of the material to avoid densification and loss of coverage.

B. Do not overload the blowing machine hopper with material. Too long a material dwell time combined with agitation of the hopper components can overprocess the insulation, creating smaller, denser particles that may install too quickly and not provide satisfactory coverage or clog the machine shredder or airlock components.

C. To ensure adequate material conditioning and velocity, tailor material feed rate to the smaller diameter blowing hose in use; i.e., slower feed rate for 3-inch versus 3 1/2-inch-diameter blowing hoses. Set up the blowing hose such that the smallest diameter hose is the longest in length.

3.5 MATERIAL STORAGE AND PROTECTION

A. Protect insulation from damage and from becoming wet before, during and after installation.

END OF SECTION

SECTION 07 25 00

WEATHER BARRIERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Sheet applied weather barrier and related accessories for wall air/moisture barrier system.

1.2 RELATED SECTIONS

A. Section 061000 - Rough Carpentry: Wood framing and bracing.

B. Section 061000 - Rough Carpentry: Sheathing.

C. Section 072100 - Thermal Insulation: Exterior wall insulation.

D. Section 074600 - Siding: Wall finish and primary weather barrier.

1.3 REFERENCES

A. The American Association of Textile Chemists and Colorists (AATCC) 127 - Water Resistance: Hydrostatic Pressure Test.

B. American Society for Testing and Materials (ASTM) E-96 - Standard Test Methods for Water Vapor Transmission of Materials.

C. American Society for Testing and Materials (ASTM) D1117 - Standard Guide for Evaluating Nonwoven Fabrics.

D. American Society for Testing and Materials (ASTM) D3330 - Standard Test Method for Peel Adhesion of Pressure-Sensitive Tape1.

E. American Society for Testing and Materials (ASTM) D3759 - Standard Test Method for Tensile Strength and Elongation of Pressure-Sensitive Tapes.

F. PSTC-1 - Peel Adhesion of Single Coated Pressure-Sensitive Tapes at 180 Degree Angle.

G. TAPPI T-460 - Porosity - Gurley.

1.4 SYSTEM DESCRIPTION

A. The airtight components and secondary moisture protection of the building enclosure and the joints, junctures and transitions between materials, products, and assemblies forming the air-tightness and moisture barrier of the building enclosure are called "the air/moisture

barrier system". Services include coordination between the trades, the proper scheduling and sequencing of the work, preconstruction meetings, inspections, tests, and related actions, including reports performed by Contractor, by independent agencies, and by governing authorities. They do not include contract enforcement activities performed by the Architect.

B. Air Barrier Penetrations: All penetrations of the air/moisture barrier and paths of air infiltration / exfiltration through the air/moisture barrier system shall be made air-tight.

C. Moisture Barrier Penetrations: All penetrations of the air/moisture barrier and paths of water migration through the air/moisture barrier system shall be made water shedding.

1.5 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Minimum of 2 years experience with installation of similar products.

B. Mock-Up: Provide a mock-up for evaluation of surface preparation and sealing techniques and application workmanship.
   1. Finish areas designated by Architect.
   2. Do not proceed with remaining work until workmanship is approved by Architect.
   3. Repair mock-up area as required to produce acceptable work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Do not store in direct sunlight. Weather barrier shall be stored in a covered area. Do not expose to building site chemicals.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.8 PROJECT CONDITIONS

A. Anticipate environmental conditions and schedule installation when conditions are within limits recommended by manufacturer for optimum results. Do not install products under

environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

A. Product Warranty: Limited product warranty against manufacturing defects for 10 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of design: James Hardie Building Products, Inc., HardieWrap Weather Barrier.

B. Submit other manufacturers' equivalents under the provisions of Section 016000.

2.2 WEATHER BARRIER SYSTEM

A. Moisture Air Barrier Sheet:
   1. Composition: Non-woven, non-perforated polyolefin.
   2. Film: MicroTech Coating with micropores to balance water holdout and breathability.
   3. Thickness: 11 mil (0.28 mm).
   4. UV Stability: Up to 180 days.
   5. Water Holdout (AATCC127): 128 inches (3250 mm).
   6. Breathability/Water Vapor Permeance (ASTM E-96A): 15 perms.
   7. Air Resistance (TAPPI T-460): >1800 sec/100 cc.
   8. Tear Strength (ASTM D1117): 15 to 18 lb (6.8 to 8.2 kg).
   9. Basis Weight: 19.4 lbs/1000 sf (9.5 kgs/100 sm).
   10. Sizes: 3 feet by 195 feet (914 mm by 59.4 m), 9 feet by 100 feet (2743 mm by 30.5 m), 9 feet by 150 feet (2743 mm by 45.7 m), 10 feet by 100 feet (3048 mm by 30.5 m), 10 feet by 150 feet (3048 mm by 45.7 m).

B. Self-adhering Flashing: Designed for peel and stick application.
   1. Composition: Butyl rubber adhesive non-woven polyolefin backing; coated Kraft paper release.
   2. Total Thickness: 25 mil (0.64 mm).
   3. UV Stability: Up to 180 days.
   4. Application Temperature: 30 degree F to 180 degree F (-1 degree C to 82 degree C).
   5. Operating Temperature: -30 degree F to 200 degree F (-34 degree C to 93 degree C).
   6. Packaging: Individually shrink-wrapped.
   7. Roll Weight: 4 inch (102 mm) = 4.6 lb (2 kg)/roll, 6 inches (152 mm) = 6.9 lb (3 kg) /roll, 9 inches (229 mm) = 9.9 lb (4.5 kg)/roll.
   8. Provide Width for Application Required: 4 inches by 100 feet (102 mm by 30.5 m) (2x4 construction), 6 inches by 100 feet (152 mm by 30.5 m) (2x4 construction), 9 inches by 100 feet (229 mm by 30.5) (2x6 construction).

C. Flexible Flashing:
   1. Composition: Butyl rubber adhesive; creped cross-laminated polyolefin backing;

polyethylene film release.

2. Total Thickness: 60 mil (1.5 mm).
3. Tensile Strength (ASTM D3759): 18 lb/inch (3.2kg/cm).
4. UV Stability: Up to 180 days.
5. Water Vapor Transfer Rate (ASTM E96-94): <.2g/100 square inches/24hrs.
6. Application Temperature: 30 degree F to 180 degree F (-1 degree C to 82 degree C).
7. Operating Temperature: -30 degree F to 200 degree F (-34 degree C to 93 degree C).
8. Packaging: Each roll is packed in a convenient dispenser box
9. Roll Weight: 6 inches (152 mm) = 22.2 lb (10kg)/roll, 9 inches (229 mm) = 33.3 lb (15 kg)/roll.
10. Provide Width for Application Required: 6 inches by 75 feet (152 mm by 23.9 m) (2x4 construction), 9 inches by 75 feet (229 mm by 23.9) (2x6 construction).

D. Seam Tape:

1. Composition: Polypropylene film coated with acrylic adhesive Total Thickness: 3.0 mil (.08 mm).
2. Adhesion Peel to HardieWrap (PSTC-1): 22 oz/inch (25 N/100 mm).
3. Tensile Strength (ASTM D3759): 32 lb/in (.58 kg/mm).
4. Elongation: 136 percent.
5. UV Stability: Up to 90 days.
6. Application Temperature: 30 degree F to 180 degree F (-1 degree C to 82 degree C).
7. Operating Temperature: -30 degree F to 200 degree F (-34 degree C to 93 degree C).
8. Packaging: Individually shrink-wrapped.
9. Roll Weight: 1 lb(0.5 kg)/roll.
10. Roll Size: 1-7/8 inches (43 mm) by 165 feet (50 m).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If framing preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Weather barrier shall be installed before window and door installation. Do not install on saturated sheathing. Weather barrier can become slippery and should not be used in any application where it may be walked on.

D. Weather barrier shall be installed on vertical wall applications only.

E. Manufacturer warrants weather barrier sheet only when covered within 180 days of its installation.

3.3 INSTALLATION

A. Moisture Air Barrier Sheet:
   1. Weather barrier shall be installed before window and door installation. Do not install on saturated sheathing. Weather barrier can become slippery and should not be used in any application where it may be walked on.
   2. Begin by affixing weather barrier extending at least 6 inches (152 mm) around a building corner. Unroll horizontally (with print side facing out) around the building covering rough window and door openings.
   3. Fasten to studs or nailable sheathing material with galvanized construction grade staples a maximum of 18 inches (457 mm) in the vertical and horizontal direction.
   4. Attach weather barrier so that it is taut and flat. The vertical overlap shall have a minimum of 6 inches (152 mm) and the vertical seam shall be taped.
   5. Assure that the bottom edge of the weather barrier extends over the sill plate and foundation interface by at least 1 inch (25 mm).
   6. Overlap upper layers of weather barrier (in shingle lap fashion) by a minimum of 6 inches below the horizontal edge, and tape the horizontal seam line.
   7. At roof to wall intersection (or wall to deck), affix wrap to the wall such that it overlaps any step flashing already in place on the wall by at least 2 inches (51 mm).

B. Flexible Flashing:
   1. Windows and Doors: Weather barrier is not designed nor guaranteed as a flashing material to prevent moisture or air from intruding behind weather barrier. Verify that flashing has previously been installed around all windows and door openings. Install flexible flashing per manufacturer's instructions.
      a. Use the inverted "Y" cut method at rough window and door openings. Do not place fasteners within 9 inches (229 mm) of the rough opening, door or window heads. This area shall not be fastened to allow for proper head flashing installation. At the top corners of the rough opening, cut the weather barrier at 45 degree to extend 9 inches (229 mm) past the joint.
      b. Fold the top flap up and out of the way and fasten temporarily.
      c. Fold the remaining three flaps in through the opening fastening them inside the opening with staples.
   2. Rough Electrical and Plumbing Penetrations: Seal with a double layer of flashing. Install the top flashing piece over the bottom flashing piece overlapping flashing layers to cover flashing cut-out necessary for placement around penetration.

C. Repairs: For minor punctures or tears, less than 3 inches (76 mm), cover and completely seal with seam tape. For larger holes, greater than 3 inches (76 mm), use slit flashing technique.

a. Slit flashing requires making a horizontal slit above the damaged area and placing a cut piece of weather barrier into the slit, covering the damaged area. Tape the perimeter of the patched area.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07 27 20

VAPOR PERMEABLE, FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 SCOPE

A. Furnish all materials, equipment, labor and supervision necessary to provide and install vapor permeable, fluid-applied membrane air barriers (infiltration barriers).

1.2 RELATED SECTIONS

A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1. Section 04 20 00 - Unit Masonry

2. Section 06 10 00 - Rough Carpentry

3. Section 07 13 26 - Waterproofing & Dampproofing

4. Section 07 62 00 - Flashing and Sheet Metal

5. Section 07 92 00 - Sealants and Caulking

1.3 SUMMARY

A. This Section includes the following:

1. Materials and installation methods for fluid applied, vapor permeable air barrier mem- brane system located in the non-accessible part of the wall.

2. Materials and installation methods to bridge and seal air leakage pathways in roof and foundation junctions, window and door openings, control and expansion joints, masonry ties, piping and other penetrations through the wall assembly.

1.4 DEFINITIONS:

A. Air Barrier Assembly: The collection of air barrier materials and auxiliary materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.5 PERFORMANCE REQUIREMENTS

A. General: Air barrier shall be capable of performing as a continuous vapor-permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Commonwealth of Massachusetts Building Code Requirements: The intent of this specification is to require compliance with 780 CMR 13, Section 1304.3 Air Leakage.

1.6 AIR BARRIERS

A. The building envelope shall be designed and constructed with a continuous air barrier to control air leakage into, or out of the conditioned space. An air barrier shall also be provided for interior partitions between conditioned space and space designed to maintain temperature or humidity levels which differ from those in the conditioned space by more than 50% of the difference between the conditioned space and design ambient conditions. The air barrier shall have the following characteristics :

1. It must be continuous, with all joints made airtight.

2. It shall have an air permeability not to exceed 0.004 cfm/sq. ft. under a pressure differential of 0.3 in. water. (1.57 psf.) (equal to 0.02Usq. m @ 75 Pa.).

3. It shall be capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement, and shall transfer the load to the structure. It shall not displace adjacent materials under full load.

4. It shall be durable or maintainable.

5. The air barrier shall be joined in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between:

a. Foundation and walls.

b. Walls and windows or doors.

c. Different wall systems.

d. Wall and roof.

e. Wall and roof over unconditioned space.

f. Walls, floor and roof across construction, control and expansion joints.

g. Walls, floors and roof to utility, pipe and duct penetrations.

h. All penetrations of the air barrier and paths of air infiltration/exfiltration shall be made air- tight.

1.7 REFERENCES

A. The following standards and publications are applicable to the extent referenced in the text. The most recent version of these standards is implied unless otherwise stated.

B. American Society for Testing and Materials (ASTM)

1. C920 Specifications for Elastomeric Joint Sealants

2. C1193 Guide for Use of Joint Sealants

3. 0412 Standard Test Methods for Rubber Properties in Tension

4. 0570 Test Method for Water Absorption of Plastics

5. 01004 Test Method for Initial Tear Resistance of Plastic Film and Sheeting

6. 01876 Test Method for Peel Resistance of Adhesives

7. 01938 Test Method for Tear Propagation Resistance of Plastic Film and Sheeting

8. 01970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection

9. 04258 Practice for Surface Cleaning Concrete for Coating

10. 04263 Test Method for Indicating Moisture in Concrete by the Plastic Sheet

Method

11. E96 Test Methods for Water Vapor Transmission of Materials

12. E154 Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

13. E162 Test Method for Surface Flammability of Materials Using a Radiant Heat Source

14. E1186 Practice for Air Leakage Site Detection in Building Envelopes and Air Retarder Systems

15. E2178-01 Standard Test Method for Air Permeance of Building Materials

1.8 SUBMITTALS

A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of air barrier.

B. Shop Drawings: Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strip, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.

1. Include details of interfaces with other materials that form part of air barrier.

2. Include details of mockups.

C. Samples: Submit representative samples of the following for approval:

1. Fluid applied membrane

2. Transition tape

3. Through Wall Flashing

D. Product Certificates: For air barriers, certifying compatibility of air barrier and accessory materials with Project materials that connect to or that come in contact with the barrier; signed by product manufacturer.

E. Qualification Data: For Applicator.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a

qualified testing agency, for air barriers, submit certified test report showing compliance with requirements specified for ASTM E2178.

G. Warranty: Submit a sample warranty identifying the terms and conditions stated in Article 1.10.

1.9 QUALITY ASSURANCE

A. Manufacturer: Air barrier systems shall be manufactured and marketed by a firm with a minimum of 20 years experience in the production and sales of waterproofing. Manufacturers proposed for use, but not named in these specifications shall submit evidence of ability to meet all requirements specified, and include a list of projects of similar design and complexity completed within the past five years.

B. Applicator Qualifications: A firm experienced in applying air barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

C. Mockups: Before beginning installation of air barrier, provide air barrier work for exterior wall assembly mockups, incorporating backup wall construction, external cladding, window, door frame and sill, insulation, and flashing to demonstrate surface preparation, crack and joint treatment, and sealing of gaps, terminations, and penetrations of air barrier membrane.

1. Coordinate construction of mockup to permit inspection by Owner's testing agency of air barrier before external insulation and cladding is installed.

2. If Architect determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.

D. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Preinstallation conference shall include the Con- tractor, installer, Architect, and system manufacturer's field representative. Agenda for meeting shall include but not be limited to the following:

1. Review of submittals.

2. Review of surface preparation, minimum curing period and installation procedures.

3. Review of special details and flashings.

4. Sequence of construction, responsibilities and schedule for subsequent operations.

5. Review of mock-up requirements.

6. Review of inspection, testing, protection and repair procedures.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials and products in labeled packages. Store and handle in strict compliance with manufacturer's instructions, recommendations and material safety data sheets. Protect from damage from sunlight, weather, excessive temperatures and construction operations. Remove damaged material from the site and dispose of in accordance with applicable regulations.

B. Do not double-stack pallets of fluid applied membrane components on the job site. Provide cover on top and all sides, allowing for adequate ventilation.

C. Protect fluid-applied membrane components from freezing and extreme heat.

D. Sequence deliveries to avoid delays, but minimize on-site storage.

1.11 PROJECT CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air barrier manufacturer. Protect substrates from environmental conditions that affect performance of air barrier. Do not apply air barrier to a wet substrate or during snow, rain, fog, or mist.

1.12 WARRANTY

A. Material Warranty: Manufacturer's standard form in which manufacturer agrees to replace fluid- applied air barrier membrane materials, that fall within specified warranty period when installed and used in strict conformance with written manufacturer's instructions.

1. Failures include, but are not limited to, the following:

a. Failure to maintain air permeance rating not to exceed 0.02 Us/sq. m. when tested per ASTM E2178, within specified warranty period.

b. Failure to maintain a vapor permeance rating greater than 10 perms when tested in accordance with ATM E96, Method B.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FLUID-APPLIED. VAPOR PERMEABLE MEMBRANE AIR BARRIER:

A. Fluid-Applied, Vapor-Permeable Membrane Air Barrier, Basis of Design: Subject to compliance with requirements. provide the following:

1. Single Component Acrylic Membrane:

a. Perm-A-Barrier VP, as manufactured by Grace Construction Products, 62 Whittemore Avenue, Cambridge, MA.

b. Air-Shield LMP as manufactured by W. R. Meadows, Inc. P.O. Box 338 Hamp- shire, IL 60140

c. Equal material by other Manufacturer.

B. Physical and Performance Properties: Provide products with the following minimum properties:

1. Membrane Air Permeance: Not to exceed 0.004 cfm/sq. ft. of surface area (at specified thickness) at 1.57-lbf/sq. ft. pressure difference (0.002 Us x sq. m of surface area at 75- Pa} when applied to CMU wall; when tested per ASTM E2178.

2. Membrane Vapor Permeance: Not less than 11.2 perms (649.6 ng/Pa x s x sq. m); when tested per ASTM E96.

3. UV Exposure Limit: Not more than 150 calendar days; per ASTM D412 and ASTM E96- Method B.

2.2 AUXILIARY MATERIALS

A. General: Auxiliary materials recommended by air barrier manufacturer for intended use and compatible with air barrier membrane. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

B. Liquid Membrane for Details and Terminations: Provide Bituthene Liquid Membrane as manufactured by Grace Construction Products, 62 Whittemore Avenue, Cambridge, MA.

C. Wall Primer (for Use with Throughwall Flashing and Tapes Applied to Substrate):

Liquid water- borne primer recommended for substrate by manufacturer of air barrier material.

1. Flash Point: No flash to boiling point
2. Solvent Type: Water

3. VOC Content: Not to exceed 1O g/1

4. Application Temperature: -4°C (25°F) and above

5. Freezing point (as packaged): -7°C (21°F)

6. Product: Perm-A-Barrier WB Primer manufactured by Grace Construction Products.

D. Flexible Membrane Wall Flashing: 0.8 mm (32 mils) of self-adhesive rubberized asphalt integrally bonded to 0.2 mm (8 mil) of cross-laminated, high-density polyethylene film to provide a min. 1.0 mm (40 mil) thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed, conforming with the following:

1. Water Vapor Transmission: ASTM E96, Method 8: 2.9 ng/m2sPa (0.05 perms) max.

2. Water Absorption: ASTM 0570: max. 0. 1% by weight

3. Puncture Resistance: ASTM E154: 356 N (80 lbs.) min.

4. Tear Resistance

   a. Initiation ASTM D1004: min. 58 N (13.0 lbs.) M.D.

   b. Propagation ASTM 01938: min. 40 N (9.0 lbs.) M.D.

5. Lap Adhesion at -4°C (25°F): ASTM 01876: 880 N/m (5.0 lbs./in.) of width

6. Low Temperature Flexibility ASTM 01970: Unaffected to -43°C (-45°F)

7. Tensile Strength: ASTM 0412, Die C Modified: min. 5.5 MPa (800 psi)

8. Elongation, Ultimate Failure of Rubberized Asphalt ASTM 0412, Die C: min. 200%.

9. Product: Perm-A-Barrier Wall Flashing manufactured by Grace

Construction Products.

E. Joint Reinforcing Strip: Air barrier manufacturer's approved tape.

F. Transition Tape: 0.8 mm (32 mils) of self-adhesive rubberized asphalt integrally bonded to 0.2 mm (8 mil) of cross-laminated, high-density polyethylene film to provide a min. 1.0 mm (40 mil) thick membrane. Membrane shall be interleaved with disposable silicone coated release paper until installed, conforming with the following:

1. Water Vapor Transmission: ASTM E96, Method B: 2.9 ng/m2sPa (0.05 perms) max.

2. Water Absorption: ASTM 0570: max. 0.1% by weight

3. Puncture Resistance: ASTM E154: 356 N (80 lbs.) min.

4. Tear Resistance

   a. Initiation ASTM 01004: min. 58 N (13.0 lbs.) M.O.

   b. Propagation ASTM 01938: min. 40 N (9.0 lbs.) M.O.

5. Lap Adhesion at -4°C (25°F): ASTM 01876: 880 N/m (5.0 lbs./in.) of width

6. Low Temperature Flexibility ASTM 01970: Unaffected to -43°C {-45°F)

7. Tensile Strength: ASTM 0412, Die C Modified: min. 5.5 MPa (800 psi)

8. Elongation, Ultimate Failure of Rubberized Asphalt: ASTM 0412, Die C: min. 200%.

9. Product: Perm-A-Barrier Wall Flashing manufactured by Grace Construction Products.

G. Substrate Patching Membrane: Manufacturer's standard trowel-grade substrate filler.

1. Product: Bituthene Liquid Membrane, manufactured by Grace Construction Products.

H. Sprayed Polyurethane Foam Sealant 1- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cu. ft (24 to 32 kg/cu. m) density; flame spread index of 25 or less according to ASTM E162; with primer and noncorrosive

substrate cleaner recommended by foam sealant manufacturer.

I. Joint Sealant: ASTM C920, single-component, neutral-curing silicone; Class 100/50 (low- modulus). Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use 0.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.

1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.

2. Verify that concrete has cured and aged for minimum time period recommended by air barrier manufacturer.

3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM 04263.

4. Verify that masonry joints are struck flush and completely filled with mortar.

5. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Refer to manufacturer's literature for requirements for preparation of substrates. Surfaces shall be sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Use repair materials and methods that are acceptable to manufacturer of the fluid- applied air barrier system.

B. Exterior sheathing panels: Ensure that the boards are sufficiently stabilized with corners and edges fastened with appropriate screws. Pre-treat all board joints with 50 - 75mm (2-3 in.} wide, manufacturer's recommended self-adhesive tape. Gaps greater than 6mm (1/4 in.) should be filled with mastic or caulk, allowing sufficient time to fully cure before application of the tape and fluid applied air barrier system.

C. Masonry Substrates: Apply air and vapor barrier over concrete block and brick with smooth trowel-cut mortar joints, struck full and flush. Fill all voids and holes, particularly in the mortar joints, with a lean mortar mix, non-shrinking grout or parge coat.

D. Related Materials: Treat construction joints and install flashing as recommended by manufacturer.

E. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Pro- vide clean, dust-free, and dry substrate for air barrier application.

F. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

G. Remove grease, oil, bitumen, form-release agents, paints, curing compound, and other penetrating contaminants or film-forming coatings from concrete.

H. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate patching membrane.

I. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

J. At changes in substrate plane, apply sealant or Bituthene Liquid Membrane at sharp corners and edges to form a smooth transition from one plane to another.

K. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous sup- port for air barrier.

3.3 JOINT TREATMENT

A. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 1193 and air barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM 04258 before coating surfaces.

1. Prime substrate as required.

B. Gypsum Sheathing: Fill joints greater than 1/4 inch (6 mm) with sealant according to ASTM C1193 and with air barrier manufacturer's written instructions. Apply tape to joint prior to installing fluid air barrier membrane.

3.4 AIR BARRIER MEMBRANE INSTALLATION

A. Apply air barrier membrane to achieve a continuous air barrier according to air barrier manufacturer's written instructions.

B. Apply air barrier membrane within manufacturer's recommended application temperature ranges.

C. Apply a continuous unbroken air barrier to substrates according to the following minimum thick- ness. Apply membrane in full contact around protrusions such as masonry ties.

1. Vapor-Permeable Membrane Air Barrier: 90-mil (2.4-mm} wet film thickness, 45-mil (1.2-mm) dry film thickness.

D. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.

E. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components.

3.5 TRANSITION STRIP INSTALLATION

A. Install strips, transition strips, and auxiliary materials according to air barrier manufacturer's writ- ten instructions to form a seal with adjacent construction and maintain a continuous air barrier.

1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.

2. Install strip on roofing membrane or base flashing so that a minimum of 3 inches {75 mm) of coverage is achieved over both substrates.

3. Install all flashings only after application of air barrier.

B. Apply primer to substrates to receive transition tapes at required rate and allow to dry. Limit priming to areas that will be covered by transition tape in same day. Reprime areas exposed for more than 24 hours.

1. Prime glass-fiber-surfaced gypsum sheathing not covered with air membrane material with number of prime coats needed to achieve required bond, with adequate drying time between coats.

C. Connect and seal exterior wall air barrier membrane continuously to roofing

membrane air barrier, concrete below-grade structures, floor-to floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

D. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.

E. Apply joint sealants forming part of air barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

F. Wall Openings: Prime concealed perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip so that a minimum of 3 inches (75 mm) of coverage is achieved over both substrates. Maintain 3 inches (75 mm) of full contact over firm bearing to perimeter frames with not less than 1 inch (25 mm) of full contact.

1. Transition Strip: Roll firmly to enhance adhesion.

G. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air barrier membrane with foam sealant.

H. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches (150 mm) beyond re- paired areas in strip direction.

3.6 FIELD QUALITY CONTROL:

A. Testing Agency: Owner may engage a qualified testing agency to perform tests and inspections and prepare test reports.

B. Inspections: Air barrier materials and installation are subject to inspection for compliance with requirements. Inspections may include the following:

1. Continuity of air barrier system has been achieved throughout the building envelope with no gaps or holes.

2. Continuous structural support of air barrier system has been provided.

3. Masonry and concrete surfaces are smooth, clean and free of cavities, protrusions, and mortar droppings.

4. Site conditions for application temperature and dryness of substrates have been maintained.

5. Maximum exposure time of materials to UV deterioration has not been exceeded.

6. Surfaces have been primed, if applicable.

7. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction {or mastic has been applied on exposed edges), with no fishmouths.

8. Termination mastic has been applied on cut edges.

9. Strips and transition strips have been firmly adhered to substrate.

10. Compatible materials have been used.

11. Transitions at changes in direction and structural support at gaps have been provided.

12. Connections between assemblies {membrane and sealants) have complied with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.

13. All penetrations have been sealed.

C. Tests: Testing to be performed will be determined by Owner's testing agency from among the following tests:

1. Qualitative Testing: Air barrier assemblies will be tested for evidence of air leakage ac- cording to ASTM E1186, smoke pencil with pressurization or depressurization.

D. Remove and replace deficient air barrier components and retest as specified above.

3.7 CLEANING AND PROTECTION:

A. Protect air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

B. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. Remove and replace air barrier exposed for more

than 150 days.

C. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.

D. Remove masking materials after installation.

END OF SECTION

SECTION 07 31 13

ASPHALT SHINGLES

PART I GENERAL

1.01 SECTION INCLUDES

A. Asphalt roofing shingles.

B. Leak barrier and roof deck protection.

C. Metal flashing associated with shingle roofing.

D. Attic ventilation.

1.02 RELATED SECTIONS

A. Section 061000 - Rough Carpentry: Framing, wood decking, and roof sheathing.

B. Section 076200 – Sheet Metal Flashing and Trim: Sheet metal flashing not associated with shingle roofing; gutters and downspouts.

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM) - Annual Book of ASTM Standards

1. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

2. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

3. ASTM B 370 - Standard Specification for Copper Sheet and Strip for Building Construction.

4. ASTM D 3018 - Standard Specification for Class A Asphalt Shingles Surfaced with Mineral Granules.

5. ASTM D 3161 - Standard Test Method for Wind-Resistance of Asphalt Shingles (Fan-Induced Method).

6. ASTM D 3462 – Standard Specification for Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules.

7. ASTM D 4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free.

8. ASTM D 7158 - Standard Test Method for Wind-Resistance of Sealed Asphalt Shingles (Uplift Force/Uplift Resistance Method).

9. ASTM E 903 – Standard Test Method for Solar Absorptance, Reflectance, and Transmission of Materials Using Integrating Spheres.

B. Underwriters Laboratories (UL) - Roofing Systems and Materials Guide (TGFU R1306)

1. UL 790 - Tests for Fire Resistance of Roof Covering Materials.
2. UL 997 - Wind Resistance of Prepared Roof Covering Materials.
3. UL 2218 – Impact Resistance of Prepared Roof Covering Materials.

C. Asphalt Roofing Manufacturers Association (ARMA)

D. Sheet Metal and Air Conditioning Contractors National Association, 1nc. (SMACNA) - Architectural Sheet Metal Manual.

E. National Roofing Contractors Association (NRCA)

F. American Society of Civil Engineers (ASCE).

1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

G. ENERGY STAR

H. Cool Roof Rating Council (CRRC)

1.04 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D1079 and the glossary of the National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual for definitions of roofing terms related to this section.

1.05 SUBMITTALS

A. Submit copies of GAF® product data sheets, detail drawings and samples for each type of roofing product.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide all primary roofing products, including shingles, underlayment, leak barrier, and ventilation, by a single manufacturer.

B. Installer Qualifications: Installer must be approved for installation of all roofing products to be installed under this section.

1.07 REGULATORY REQUIREMENTS

A. Provide a roofing system achieving an Underwriters Laboratories (UL) Class A fire classification.

C. Install all roofing products in accordance with all federal, state and local building codes.All work shall be performed in a manner consistent with current OSHA guidelines.

1.08 PREINSTALLATION MEETING

A. General: For all projects in excess of 250 squares of roofing, a pre-installation meeting is strongly recommended.

B. Timing: The meeting shall take place at the start of the roofing installation, no more than 2 weeks into the roofing project.

C. Attendees: Meeting to be called for by manufacturer's certified contractor. Meeting's mandatory attendees shall include the certified contractor and the manufacturer's representative. Non-mandatory attendees shall include the owner's representative, architect or engineer's representative, and the general contractor's representative.

D. Topics: Certified contractor and manufacturer's representative shall review all pertinent requirements for the project, including but not limited to, scheduling, weather considerations, project duration, and requirements for the specified warranty.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Store all products in manufacturer's unopened, labeled packaging until they are ready for installation.

B. Store products in a covered, ventilated area, at temperature not more than 110 degrees F (43 degrees C); do not store near steam pipes, radiators, or in direct sunlight.

C. Store bundles on a flat surface. Maximum stacking height shall not exceed GAF®'s recommendations. Store all rolls on end.

D. Store and dispose of solvent-based materials in accordance with all federal, state and local regulations.

1.10 WEATHER CONDITIONS

A. Proceed with work only when existing and forecasted weather conditions will permit work to be performed in accordance with GAF®'s recommendations

1.11 WARRANTY Provide to the owner a **GAF® WeatherStopper® Golden Pledge® Ltd Warranty** covering:

1. Roofs installed by a Certified GAF® Master Elite™ Contractor only.
2. Manufacturing defects: 100% coverage for materials and labor for:
   a Any other type of owner or building – 40 years with the first 20 years non-prorated. (excludes Marquis WeatherMax and Royal Sovereign)
3. Workmanship errors: 100% coverage for workmanship errors for:
   a Any other type of owner or building - 20 years.
4. Roof system NOT installed over an existing roof, all existing roof materials must be removed to the deck.
5. Warranted against algae discoloration for 10 years

6. Full roof installations (Roofs installed on portions of buildings do not qualify) using the following GAF® products.

   a You must use GAF® Roof Deck Protection.

   b You must use eligible GAF® Leak Barrier in valleys and around dormers, sidewalls, firewalls, chimneys, plumbing vents, and skylights. In the North, leak barriers must be used at all eaves at least 24 inch inside warm wall.

   c You must use GAF® pre-cut starter strip products (only those with factory applied adhesive) at the eaves. Note: To obtain bonus wind coverage, you must use GAF® pre cut starter strip products (with factory applied adhesive) at the eaves and rakes and you must install each shingle using 6 nails. For Miami Dade County Florida, no adhesive on rakes. You must cement the starter strip in and nail along the rake.

   d You must use eligible COBRA® ventilation with adequate intake ventilation. Master Flow® exhaust ventilation products can be substituted only if COBRA® ridge ventilation cannot be installed due to a structure's architecture. In any event, adequate ventilation should meet the following requirements:

      i. Minimum net free ventilation area of 1 sq ft per 150 sq ft of ceiling area is required. When intake vents are located at the eaves and exhaust vents are located near the roof's peak (in a properly balanced system) for maximum air flow, ventilation may be reduced to 1 sq ft per 300 sq ft. If these standards are not met, GAF® cannot be responsible for damage caused by inadequate ventilation.

   e You must use GAF® Ridge Cap Shingles or shingles that correspond to the shingle product you are installing.

   f You must use eligible GAF® Roofing Shingles.

   g New metal flashings must be installed. Metal drip edge must be used at eaves and is recommended at rake edges.

7. In addition to the requirements listed above, you installer must register and pay for this warranty. On projects that total more than 250 squares, the permanent Golden Pledge® Ltd Warranty will be issued only if the project passes GAF®'s final inspection. GAF® reserves the right to withhold the warranty if the roof has not been installed according to GAF®'s written application instructions. GAF® also strongly recommends that your Master Elite® Contractor schedule a start-up and at least one interim inspection on projects of 250 squares or more by contacting GAF® at least three weeks prior to the start of roof work.

PART II PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design Manufacturer: GAF®, 1361 Alps Rd. Wayne NJ 07470. Tel: 1-973-628-3000.

B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.02 SHINGLES

A. Heavyweight, granule surfaced, self sealing asphalt shingle with a strong fiberglass reinforced Micro Weave® core and a mineral granule surfacing. Architectural laminate styling provides a wood shake appearance with a 5 5/8 inch exposure. Features highly reflective roofing granules that bounce back the sun's rays and more effectively release absorbed heat. Rated by the Cool Roof Rating Council (CRRC) and meet initial EnergyStar® performance levels. UL 790 Class A rated with UL 997 Wind Resistance Label; ASTM D 7158, Class H; ASTM D 3161, Type 1; ASTM D 3018, Type 1; ASTM D 3462; AC438; CSA A123.5-98; Dade County Approved, Florida Building Code Approved, Texas Dept of Insurance Approved, ICC Report Approval, Title 24 compliant and Energy Star compliant. **Timberline® Cool Series** Energy-Saving Architectural Shingles, by GAF®.

1. Color: As selected from manufacturers' full range.

2.03 HIP AND RIDGE SHINGLES

A. High profile self sealing hip and ridge cap shingle matching the color of selected roof shingle. Each bundle covers approx. 20 lineal feet (6.10m). **Timbertex®** Premium Ridge Cap Shingles, by GAF®.

2.04 STARTER STRIP

A. Self sealing starter shingle designed for premium roof shingles. Each bundle covers approx. 100 lineal feet (30.48m) for English and metric shingles or 50 lineal feet (15.24m) for oversized shingles. **WeatherBlocker™** Eave/Rake Starter Strip by GAF®.

2.05 LEAK BARRIER

A. Self-adhering, self sealing, bituminous leak barrier surfaced with fine, skid-resistant granules. Approved by UL, Dade County, ICC, State of Florida and Texas Department of Insurance. Each roll contains approx. 150 sq ft (13.9 sq.m.), 36" X 50' (0.9m x 20.3m) or 200 sq ft (18.6 sq.m.), 36" X 66.7' (0.9m x 20.3m). **WeatherWatch®** Leak Barrier**,** by GAF®.

2.06 SHINGLE UNDERLAYMENT

A. Premium, water repellant, breather type non-asphaltic underlayment. UV stabilized polypropylene construction. Meets or exceeds ASTM D226 and D4869. Approved by Dade Country, Florida Building Code, and ICC. Each roll contains approximately 10 squares (1003 sq. ft.) of material and is 54" x 223'. **Deck-Armor™** Premium Breathable Roof Deck Protection, by GAF®.

2.07 ROOFING CEMENT

A. Asphalt Plastic Roofing Cement meeting the requirements of ASTM D 4586, Type I or II.

2.08 ROOF ACCESSORIES

A. Exterior acrylic rust resistant aerosol roof accessory paint. Each 6 oz can is available in boxes of 6 and in a wide variety of colors to compliment the roof. **Shingle-Match™** Roof Accessory Paint by GAF®.

2.09 ATTIC VENTILATION

A. Ridge Vents

1. Rigid plastic ridge ventilator designed to allow the passage of hot air out of attics. For use in conjunction with eave/ soffit intake ventilation products. Provides 18.0 sq inches (11613 sq.mm/m) in Net Free Ventilation Area per lineal foot. Each package contains 40 lineal feet (12.19m) of vent. **Cobra® Rigid Vent 3™** ridge vent (includes 3" (76mm) galvanized ring shank nails), by GAF®

2.10 NAILS

A. Standard round wire, zinc-coated steel or aluminum; 10 to 12 gauge, smooth, barbed or deformed shank, with heads 3/8 inch (9mm) to 7/16 inch (11mm) in diameter. Length must be sufficient to penetrate into solid wood at least 3/4 inch (19mm) or through plywood or oriented strand board by at least 1/8 inch (3.18mm).

2.11 METAL FLASHING 4 gauge hot-dip galvanized steel sheet, complying with ASTM A 653/A 653M, G90/Z275.

PART III EXECUTION

3.01 EXAMINATION

A. Do not begin installation until the roof deck has been properly prepared and inspected and approved by Owner.

B. If roof deck preparation is the responsibility of another installer, notify the architect or building owner of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Remove all existing roofing down to the roof deck.

B. Verify that the deck is dry, sound, clean and smooth. It shall be free of any depressions, waves, and projections. Cover with sheet metal, all holes over 1 inch (25mm) in diameter, cracks over 1/2 inch (12mm) in width, loose knots and excessively resinous areas.

C. Replace damaged deck with new materials.

D. Clean deck surfaces thoroughly prior to installation of eaves protection membrane and underlayment.

E. Owner to inspect installation of new roofing substrate prior to the installation of the finish roof system.

3.03 INSTALLATION OF UNDERLAYMENTS General:

A. Install using methods recommended by GAF®, in accordance with local building codes. When local codes and application instructions are in conflict, the more stringent requirements shall take precedence.

B. Eaves:

1. Install eaves edge metal flashing tight with fascia boards; lap joints 2 inches (51mm) and seal with plastic cement or high quality urethane sealant; nail at the top of the flange.

2. In the north, and on all roofs between 2/12 and 4/12 (low slopes) install GAF® leak barrier up the slope from eaves edge a full 36 inches (914mm) or to at least 24 inches (610 mm) beyond the interior “warm wall”. Lap ends 6 inches (152mm) and bond.

C. Valleys:

1. Install eaves protection membrane at least 36 (914mm) inches wide and centered on the valley. Lap ends 6 inches (152mm) and seal.

2. Where valleys are indicated to be "open valleys", install metal flashing over GAF® leak barrier before GAF® roof deck protection is installed; DO NOT nail through the flashing. Secure the flashing by nailing at 18 inches (457 mm) on center just beyond edge of flashing so that nail heads hold down the edge.

D. Hips and Ridges:

1. Install GAF® leak barrier along entire lengths. If ridge vents are to be installed, position the GAF® leak barrier so that the ridge slots will not be covered.

E. Roof Deck:

1. Install one layer of GAF® roof deck protection over the entire area not protected by GAF® leak barrier at the eaves or valley. Install sheets horizontally so water sheds and nail in place.

2. On roofs sloped at more than 4:12, lap horizontal edges at least 2 inches (51mm) and at least 2 inches (51mm) over eaves protection membrane.

3. On roofs sloped between 2 :12 and 4:12, lap horizontal edges at least 19 inches (482 mm) and at least 19 inches (482mm) over eaves protection membrane.

4. Lap ends at least 4 inches (102 mm). Stagger end laps of each layer at least 36 inches (914 mm).

5. Lap GAF® roof deck protection over GAF® leak barrier in valley at least 6 inches (152mm).

F. Deck-Armor™ Application

1. Deck-Armor shall be installed over a clean, dry deck.
2. Install Weather Watch® or StormGuard® Leak Barrier at eaves, valleys, rakes, skylights, dormers and other vulnerable leak areas.
3. Lay Deck-Armor™ over deck and overlap 3" (76mm) at side laps and 6" (152mm) at end laps.
4. For exposure to rain or snow, overlap 12" (305mm) at end laps.
5. For side and end laps: fasten Deck-Armor 12" (305mm) o.c. (6" (152mm)o.c. for high wind areas).
6. For middle of the roll: fasten Deck-Armor 24" (610mm) o.c. (12" (305mm) o.c. for high wind areas).
7. For exposure to rail or snow, completely cover all side laps, end laps and fasteners with tape.
8. For long term exposure see complete Deck-Armor installation instructions for side lap detail.
9. If roof may be exposed to high winds, apply tape over all fasteners at the center of the roll to prevent rain or snow from entering at the fasteners.
10. For slopes less that 2:12, a double application of Deck-Armor is required. See complete Deck-Armor installation instructions for more information.

G. Penetrations:

1. Vent pipes: Install a 24 inch (610 mm) square piece of eaves protection membrane lapping over roof deck underlayment; seal tightly to pipe.
2. Vertical walls: Install eaves protection membrane extending at least 6 inches (152mm) up the wall and 12 inches (305mm) on to the roof surface. Lap the membrane over the roof deck underlayment.
3. Chimneys: Install eaves protection membrane around entire chimney extending at least 6 inches (152mm) up the wall and 12 inches (305mm) on to the roof surface. Lap the membrane over the roof deck underlayment.
4. Rake Edges: Install metal edge flashing over eaves protection membrane and roof deck underlayment; set tight to rake boards; lap joints at least 2 inches (51mm) and seal with plastic cement; secure with nails.

3.04 INSTALLATION OF STARTER SHINGLES

A. General:

1. Install in accordance with GAF®'s instructions and local building codes. When local codes and application instructions are in conflict, the more stringent requirements shall take precedence.
2. Refer to application instructions for the selected starter strip shingles.

B. Placement and Nailing:

1. For maximum wind resistance along rakes & eaves, install any GAF® starter strip containing sealant or cement shingles to underlayment and each other in a 4" (102mm) width of asphalt plastic roof cement.
2. Place starter strip shingles 1/4" – 3/4" (6 – 19mm) over eave and rake edges to provide drip edge.
3. Nail approximately 1-1/2" – 3" (38 – 76mm) above the butt edge of the shingle.
4. Rake starter course should overlap eave edge starter strip at least 3" (76mm).

3.05 INSTALLATION OF SHINGLES

A. General:

1. Install in accordance with GAF®'s instructions and local building codes. When local codes and application instructions are in conflict, the more stringent requirements shall take precedence.
2. Minimize breakage of shingles by avoiding dropping bundles on edge, by separating shingles carefully (not by "breaking" over ridge or bundles), and by taking extra precautions in temperatures below 40 degrees F (4 degrees C).
3. Handle carefully in hot weather to avoid scuffing the surfacing, or damaging the shingle edges.

B. Placement and Nailing: Secure with 4, 5, or 6 nails per shingle per GAF®'s application instructions or local codes.

2. Placement of nails varies based on the type of shingle specified. Consult the application instructions for the specified shingle for details.
3. Nails must be driven flush with the shingle surface. Do not overdrive or under drive the nails.
4. Shingle offset varies based on the type of shingle specified. Consult the application instructions for the specified shingle for details.

C. Valleys Install valleys using the "closed cut valley" method:

a Run the first course of shingles from the higher roof slope across the valley at least 12 inches (305mm).

b Run succeeding courses of shingles from the lower roof slope across the valley at least 12 inches (305mm) and nail not closer than 6 inches (152mm) to center of valley.

c Run shingles from the upper roof slope into the valley and trim 2 inches (51mm) from the center line.

D. Penetrations

1. All Penetrations are to be flashed according to GAF®, ARMA and NRCA application instructions and construction details.

3.06 PROTECTION

A. Protect installed products from foot traffic until completion of the project.

B. Any roof areas that are not completed by the end of the workday are to be protected from moisture and contaminants.

END OF SECTION

SECTION 07 46 33

VINYL SIDING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Vinyl siding, Polymer shake and shingle siding.

B. Vinyl soffits.

C. Accessories and trim.

1.2 RELATED SECTIONS

A. Section 061000 – Rough Carpentry.

B. Section 072500 – Weather Barriers.

C. Section 079200 – Joint Sealants.

1.3 REFERENCES

A. ASTM D 3679 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Siding.

B. ASTM D 4477 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Soffit.

C. ASTM D 5206 - Standard Windload Resistance Test.

D. ASTM E 84 - Standard test Method for Surface Burning Characteristics of Building Materials.

E. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

F. ASTM D7254 – Standard Specification for Polypropylene (PP) Siding

1.4 DESIGN/PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Code compliance in accordance with the following:
   1. IBC and IRC
   2. ICC Evaluation Service

3. CCMC
4. State of Florida

B. PVC Fire Resistance: Provide vinyl siding products that meet or exceed the following ratings:
1. Flame Spread Index < 25, smoke development rating <450, per ASTM E 84.
2. Fire endurance classification of 1 hour, per ASTM E 119 in a wall assembly.

C. Cedar Impressions Shake and Shingle Siding Fire Resistance: Provide thermoplastic polyolefin siding products that meet or exceed the following ratings:
1. Flame Spread Index <200 per ASTM E-84.

1.5 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

D. Verification Samples: For each finish product specified, two samples, minimum size 12 inches (300 mm) long, representing actual product, color, and patterns.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Provide installer with not less than three years of experience with products specified or has obtained 5-Star Green Contractor (Preferred), 5-Star Contractor (preferred), or Master Craftsman credentials from CertainTeed.

B. Mock-Up: Provide a mock-up for evaluation of installation techniques and workmanship.
1. Finish areas designated by Architect.
2. Do not proceed with remaining work until workmanship and color is approved by Architect.
3. Reinstall mock-up area as required to produce acceptable work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation. Refer to manufacturer’s installation instructions for specific storage and handling requirements.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

A. Provide manufacturer's standard lifetime limited warranty on siding products, transferable to new owners.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of design: CertainTeed Corporation,

B. Submit other manufacturers' equivalents under the provisions of Section 016000.

2.2 MATERIALS

A. Polymer Shakes and Shingle Siding: Provide products made of molded polypropylene as specified in this section and manufactured to comply with requirement of ASTM D 7254
   1. Provide elongated nailing slots on nailing flanges to allow movement
   2. Provide products that meet weathering requirements of ASTM D 7254
   3. In accordance with ICC – ES Acceptance Criteria AC366
   4. Provide panel thermometer allowing for proper spacing in various temperatures

B. Vinyl Siding, Soffit and Components: Provide products made of extruded polyvinyl chloride as specified in this section and manufactured to comply with requirements of ASTM D 3679.
   1. Provide elongated nailing slots on nailing flanges to allow for movement.
   2. Factory-notch ends of horizontal panels to form overlapping joints.
   3. Provide products that meet weathering requirements of ASTM D 3679.

2.3 POLYMER SHAKES AND SHINGLE SIDING

A. Cedar Impressions D6.25 Half Round Shingles:
   1. Design: Double 6.25 inch (159 mm) shingle; cedar grain finish.
   2. Lock: Molded Perimeter Lock.
   3. Width: 12.5 inch (318 mm).
   4. Length: 32 inches (813 mm) plus or minus .025 inch (6 mm).

5. Average Thickness: 0.100 inch (2.54 mm).
6. Panel Projection: 3/4 inch (19 mm).
7. Panel Exposure: 6.25 inches (159 mm) plus or minus .062 inch (1.57 mm).
8. Maximum Warp (per 2 panels): 0.250 inch (6 mm).
9. Color: As selected by Architect from manufacturer's standards.

2.4 VINYL SIDING

A. Monogram 46 D4:
1. Design: Double 4 inch (102 mm) clapboard; rough cedar finish with STUDfinder Installation System.
2. Nail Hem: RigidForm 220 Technology Roll Over Nail Hem.
3. Lock: CertiLock self aligning post formed positive lock.
4. Width: 8 inch (203 mm).
5. Length: 12 feet 6 inches (3.81 m) plus or minus .025 inch (6 mm).
6. Average Thickness: 0.046 inch (1.17 mm).
7. Panel Projection: 3/4 inch (19 mm).
8. Panel Exposure: 4 inch (102 mm) plus or minus .062 inch (1.57 mm).
9. Maximum Warp (per 2 panels): 0.250 inch (6 mm).
10. Color: As selected by Architect from manufacturer's standards.

B. Monogram 46 D5:
1. Design: Double 5 inch (127 mm) clapboard; rough cedar finish with STUDfinder Installation System.
2. Nail Hem: RigidForm 220 Technology Roll Over Nail Hem.
3. Lock: CertiLock self aligning post formed positive lock.
4. Width: 10 inch (254 mm).
5. Length: 12 feet (3.66 m) plus or minus .025 inch (6 mm).
6. Average Thickness: 0.046 inch (1.17 mm).
7. Panel Projection: 3/4 inch (19 mm).
8. Panel Exposure: 5 inch (127 mm) plus or minus .062 inch (1.57 mm).
9. Maximum Warp (per 2 panels): 0.250 inch (6 mm).
10. Color: As selected by Architect from manufacturer's standards.

2.5 VINYL CARPENTRY SOFFITS

A. Ironmax D5 soffit and vertical siding, solid.
1. Design: Double 5 inches (127 mm) solid; woodgrain finish.
2. Width: 10 inches (254 mm) plus or minus .062 inch (1.57 mm).
3. Length: 12 feet (3.66 m) plus or minus) .025 inch (6 mm)
4. Average Thickness: 0.046 inch (1.2 mm).
5. Exposure: 5 inches (127 mm) single nailing hem.

6. Maximum Warp (per 2 panels): 0.250 inch (6 mm).
7. Color: As selected by Architect from manufacturer's standards.

B. Ironmax D5 soffit, fully vented.
1. Design: Double 5 inches (127 mm) fully vented; woodgrain finish.
2. Width: 10 inches (254 mm) plus or minus .062 inch (1.57 mm).
3. Length: 12 feet (3.66 m) plus or minus) .025 inch (6 mm).
4. Average Thickness: 0.046 inch (1.2 mm).
5. Exposure: 5 inches (127 mm) single nailing hem.
6. Maximum Warp (per 2 panels): 0.250 inch (6 mm).
7. Ventilation: 6.42 sq. inches per sq. ft.
8. Color: As selected by Architect from manufacturer's standards.

C. Soffit Accessories (as required for installation):
1. J-Channel: 3/8 inch (10 mm), 1/2 inch (13mm) and 3/4 inch (19mm) by 12 feet, 6 inch (3.81 m) length, for vertical and eave applications.
2. F-Channel: 5/8 inch (15.88 mm) and 3/4 inch (19 mm) by 12 feet 6 inches (3.81 m) length.
3. Soffit H-Bar: 3/8 inch (10 mm) , 1/2 inch (13 mm) or 3/4 inch (19 mm) by 12 feet, 6 inches (3.81 m) length, for horizontal and eave applications.
4. Soffit Cove Trim: 1/2 inch (12.7 mm) by 12 feet, 6 inches (3.81 m) length.
5. Color: To match soffit panels.

2.6 VINYL CARPENTRY ACCESSORIES

A. Standard Accessories (as required for installation):
1. Corner post: Standard width, 10 feet (3.05 m), 12 feet (3.66 m), and 20 feet (6.10 m) lengths.
2. J-Channel: Standard width, 12 feet, 6 inches (3.81 m) length.
3. Undersill trim: ¾" face, 12 feet, 6 inch (3.81 m) length.
4. Dual undersill trim: ¾" face, 12 feet 6 inches (3.81 m) length.
5. 2-1/2 inch (64 mm) Metal Starter Strip. (No Color)
6. 2-1/4 inch (57 mm) Vinyl Starter Strip. (No Color)
7. Color: refer to CTS002 for color availability of accessories

B. Optional Accessories (as required for installation):
1. D7 Straight Edge Perfection Mitered Corner Post, 14 inches (355.6 mm).
2. D7 Straight Edge Perfection Mitered inside Corner Post, 14 inches (355.6 mm)
3. T5 Straight Edge Perfection Mitered Corner Post, 15 inches (381 mm).
4. D7 Staggered Edge Perfection Mitered Corner Post, 14 inches (355.6 mm).
5. D7 Straight Edge Rough-Split Mitered Corner Post, 14 inches (355.6 mm)
6. D9 Staggered Rough-Split Mitered Corner Post, 18.5 inches (453.25 mm).

7. 2-1/2 inch (64 mm) Window and Door Casing.
8. 2-1/2 inch (64 mm) Vinyl Starter Strip.
9. 5 inch (127 mm) Lineal: 5 inch by 20 feet (127 mm by 6.1 m) length.
10. 3-1/2 inch (89 mm) Lineal: 3-1/2 inches by 12 feet, 6 inches (89 mm by 3.81 m) length.
11. Cornice Molding (64 mm).
12. 3-1/2 inches (89 mm) Snap-on Lineal: 3-1/2 inch by 12 feet 6 inches (89 mm by 3.81 m) length.
13. Crown Molding: 2-1/2 inches by 10 feet (64 mm by 3.05 m) length.
14. SuperCorners:
    a. Fluted – 5-1/2 inches by 20 feet (140 mm by 6.1 m) length.
    b. Traditional – 6 inches by 20 feet (152 mm by 6.1 m) length.
    c. Beaded – 6 inches by 20 feet (152 mm by 6.1 m) length.
15. Color: refer to CTS002 for color availability of accessories.

2.7 FASTENERS

A. Provide galvanized or other corrosion-resistant nails as recommended by manufacturer of siding products.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Examine, clean, and repair as necessary any substrate conditions which would be detrimental to proper installation.

B. Do not begin installation until unacceptable conditions have been corrected.

3.3 INSTALLATION

A. Install products in accordance with the latest printed instructions of the manufacturer.

B. Installer should have current 5-Star Contractor (preferred) or Master Craftsman credentials.

C. Install products with all components true and plumb.

D. *For Vinyl Siding*: Nail horizontal panels by placing nail in center of slot. Nail vertical panels by placing first nail at top of top slot and remaining nails in center of slots. Drive nails straight, leaving 1/16 inch (1.6 mm) space between nail head and flange of panel. (NOTE: Refer to CTS205 Installation Manual for latest installation recommendations) *For Polymer Siding:* Refer to CTS205 Installation Manual for latest installation recommendations.

E. Allow space between both ends of siding panels and trim for thermal movement. Overlap horizontal panel ends one-half the width of factory pre-cut notches.

F. Stagger lap joints in horizontal siding in uniform pattern as successive courses of siding are installed.

G. Install J-channel and flashing to accommodate successive courses of vertical siding. Install wood shims at building corners to bring cut edges of vertical siding out to correct plane.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.5 CLEANING

A. At completion of work, remove debris caused by siding installation from project site.

END OF SECTION

SECTION 07 46 46

FIBER-CEMENT SIDING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fiber-cement lap siding, panels, trim, fascia, moulding and accessories.

1.2 RELATED SECTIONS

A. Section 061000 - Rough Carpentry: Wood framing and bracing.

B. Section 061000 - Rough Carpentry: Sheathing.

C. Section 072100 - Insulation: Exterior wall insulation.

D. Section 072500 – Weather Barriers.

1.3 REFERENCES

A. ASTM D3359 - Standard Test Method for Measuring Adhesion by Tape Test, Tool and Tape.

B. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.

1.4 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings: Provide detailed drawings of atypical non-standard applications of cementitious siding materials which are outside the scope of the standard details and specifications provided by the manufacturer.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 4 by 6 inches (100 by 150 mm), representing actual product, color, and patterns.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Minimum of 2 years experience with installation of similar products.

B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish areas designated by Architect.
   2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
   3. Refinish mock-up area as required to produce acceptable work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store siding on edge or lay flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 WARRANTY

A. Product Warranty: Limited, non-pro-rated product warranty.
   1. Lap siding for 30 years.
   2. Soffit panels for 30 years.
   3. Shingle siding for 30 years.
   4. Trim boards for 15 years.

B. Finish Warranty: Limited product warranty against manufacturing finish defects for 15 years from date of purchase.
   1. Finish warranty includes the coverage for labor and material.

C. Workmanship Warranty: Application limited warranty for 2 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of design: James Hardie Building Products, Inc.
   1. HardiePlank HZ10 lap siding.
   2. HardieSoffit HZ10 panel.

3. HardieShingle HZ10 siding.

B. Submit other manufacturers' equivalents under the provisions of Section 016000.

2.2 SIDING

A. Lap siding, Soffit panels and Shingle siding requirement for Materials:
1. Fiber-cement Siding - complies with ASTM C 1186 Type A Grade II.
2. Fiber-cement Siding - complies with ASTM E 136 as a noncombustible material.
3. Fiber-cement Siding - complies with ASTM E 84 Flame Spread Index = 0, Smoke Developed Index = 5.
4. CAL-FIRE, Fire Engineering Division Building Materials Listing - Wildland Urban Interface (WUI) Listed Product.
5. National Evaluation Report No. NER 405 (BOCA, ICBO, SBCCI, IBC, IRC).
6. City of Los Angeles, Research Report No. 24862.
7. Miami Dade County, Florida Notice of Acceptance 07-0418.04.
8. US Department of Housing and Urban Development Materials Release 1263d
9. California DSA PA-019.
10. City of New York M EA 223-93-M.
11. Florida State Product Approval FL889.
12. Texas Department of Insurance Product Evaluation EC-23.

B. Lap Siding:
1. Type: Smooth 5-1/4 inches (133 mm) with 4 inches (102 mm) exposure.
2. Type: Smooth 7-1/4 inches (184 mm) with 6 inches (152 mm) exposure.

C. Shingle Siding:
1. Type: HardieShingle Straight-Edge Notched Panel 48 inches (1219 mm) wide by 16 inches (406mm) high with 7 inches (178 mm) exposure.

D. Trim:
1. Trim boards and Fascia boards as manufactured for use with siding and soffit products by manufacturer.

2.3 FASTENERS

A. Utilize wood framing fasteners as appropriate for building code compliance for maximum basic wind speed and / or applicable shear values.

2.4 FINISHES

A. Factory Primer: Provide factory applied universal primer.
1. Primer: Factory primed by manufacturer.

2. Topcoat: Refer to Section 099100.

B. Factory Finish:
   1. Definition: Factory applied finish; defined as a finish applied in the same facility and company that manufactures the siding substrate.
   2. Process:
      a. Factory applied finish by fiber cement manufacturer in a controlled environment within the fiber cement manufacturer's own facility utilizing a multi-coat, heat cured finish within one manufacturing process.
      b. Each finish color must have documented color match to delta E of 0.5 or better between product lines, manufacturing lots or production runs as measured by photospectrometer and verified by third party.
   3. Protection: Factory applied finish protection such as plastic laminate that is removed once siding is installed
   4. Accessories: Complete finishing system includes pre-packaged touch-up kit provided by fiber cement manufacturer. Provide quantities as recommended by manufacturer.

C. Factory Finish Color for Trim, Soffit and Siding Colors:
   1. To be selected from manufacturer’s standard colors.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If framing preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Nominal 2 inch by 4 inch (51 m by 102 mm) wood framing selected for minimal shrinkage and complying with local building codes, including the use of water-resistive barriers or vapor barriers where required. Minimum 1-1/2 inches (38 mm) face and straight, true, of uniform dimensions and properly aligned.
   1. Install water-resistive barriers and claddings to dry surfaces.
   2. Repair any punctures or tears in the water-resistive barrier prior to the installation of the siding.
   3. Protect siding from other trades.

D. Minimum 20 gauge 3-5/8 inch (92 mm) C-Stud 16 inches maximum on center or 16 gauge 3-5/8 inches (92 mm) C-Stud 24 inches (610 mm) maximum on center metal framing complying with local building codes, including the use of water-resistive barriers and/or vapor barriers where required. Minimum 1-1/2 inches (38 mm) face and straight, true, of uniform dimensions and properly aligned.
   1. Install water-resistive barriers and claddings to dry surfaces.

2. Repair any punctures or tears in the water-resistive barrier prior to the installation of the siding.
3. Protect siding from other trades.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Install a water-resistive barrier is required in accordance with local building code requirements.

D. The water-resistive barrier must be appropriately installed with penetration and junction flashing in accordance with local building code requirements.

E. Install weather barrier in accordance with local building code requirements.

F. Use Seam Tape and joint and laps.

G. Install flashing.

3.3 INSTALLATION - LAP SIDING

A. Install materials in strict accordance with manufacturer's installation instructions.

B. Starting: Install a minimum 1/4 inch (6 mm) thick lath starter strip at the bottom course of the wall. Apply planks horizontally with minimum 1-1/4 inches (32 mm) wide laps at the top. The bottom edge of the first plank overlaps the starter strip.

C. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.

D. Align vertical joints of the planks over framing members.

E. Maintain clearance between siding and adjacent finished grade.

F. Locate splices at least one stud cavity away from window and door openings.

G. Use off-stud metal joiner in strict accordance with manufacturer's installation instructions.

H. Wind Resistance: Where a specified level of wind resistance is required lap siding is installed to framing members and secured with fasteners described in Table No. 2 in National Evaluation Service Report No. NER-405.

I. Face nail to sheathing.

J. Locate splices at least 12 inches (305 mm) away from window and door openings.

3.4 INSTALLATION - SHINGLESIDE CLADDING

A. Install materials in strict accordance with manufacturer's installation instructions.

B. Substrate: Install a minimum 7/16 inch (11 mm) thick OSB wall sheathing or equivalent braced walls complying with applicable building codes.

C. Starting: Install a minimum 1/4 inch (6 mm) thick lath starter strip at the bottom course of the wall.

D. Maintain clearance between siding and adjacent finished grade.

E. Apply starter course of 10 inches (254 mm) shingles or 9-1/2 inches (241 mm) lap siding overlapping the starter strip.

F. Apply subsequent courses horizontally with a minimum 10 inch overlap at the top and a minimum 2 inch (51 mm) side lap. The bottom edge of the first two courses overlaps the starter strip.

G. Fasten between 1/2 inch (13 mm) and 1 inch (25 mm) in from the side edge and between 8-1/2 inches (216 mm) and 9 inches (229 mm) up from the shingle bottom edge.

H. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.

I. Ensure vertical joints of overlapping shingle course do not align.

J. Wind Resistance: Where a specified level of wind resistance is required, Shingle siding is installed to substrate and secured with a minimum two fasteners described in Table No. 6, 7 and 8 in National Evaluation Service Report No. NER-405.

3.5 INSTALLATION - TRIM BOARDS

A. Install materials in strict accordance with manufacturer's installation instructions. Install flashing around all wall openings.

B. Fasten through trim into structural framing or code complying sheathing. Fasteners must penetrate minimum 3/4 inch (19 mm) or full thickness of sheathing. Additional fasteners may be required to ensure adequate security.

C. Place fasteners no closer than 3/4 inch (19 mm) and no further than 2 inches (51 mm) from side edge of trim board and no closer than 1 inch (25 mm) from end. Fasten maximum 16 inches (406 mm) on center.

D. Maintain clearance between trim and adjacent finished grade.

E. Trim inside corner with a single board trim both side of corner.

F. Outside Corner Board Attach Trim on both sides of corner with 16 gage corrosion resistant finish nail 1/2 inch (13 mm) from edge spaced 16 inches (406 mm) apart, weather cut each end spaced minimum 12 inches (305 mm) apart.

G. Allow 1/8 inch gap between trim and siding.

H. Seal gap with high quality, paint-able caulk.

I. Shim frieze board as required to align with corner trim..

J. Fasten through overlapping boards. Do not nail between lap joints.

K. Overlay siding with single board of outside corner board then align second corner board to outside edge of first corner board. Do not fasten Trim boards to Trim boards.

L. Shim frieze board as required to align with corner trim.

M. Install Trim Fascia boards to rafter tails or to sub fascia.

3.6 FINISHING

A. Finish unprimed siding with a minimum one coat high quality, alkali resistant primer and one coat of either, 100 percent acrylic or latex or oil based, exterior grade topcoats or two coats high quality alkali resistant 100 percent acrylic or latex, exterior grade topcoat within 90 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.

B. Finish factory primed siding with a minimum of one coat of high quality 100 percent acrylic or latex or oil based exterior grade paint within 180 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.

3.7 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07 47 70

POLYMERIC SIDING AND ACCESSORIES

PART 1 - GENERAL

1.1 SCOPE

A. Furnish all labor, materials, equipment and supervision necessary to provide and install Polymeric Cladding (Everlast) and accessories as shown on the drawings and specified herein.

1.2 RELATED SECTIONS

A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1. Section 07 21 00 - Insulation (for infiltration barrier)

2. Section 07 62 00 - Sheet Metal Flashing and Trim

3. Section 07 92 00 - Sealants and Caulking (for sealants)

1.3 SUBMITTALS

A. Submit manufacturer's data illustrating configuration and installation directions.

B. Submit actual samples of shutter, siding, and soffit material for color selection by the Architect.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility for Siding and Accessories: Obtain each color, grade, finish, type, and variety of siding and related accessories from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

B. Engage an experienced installer who has completed siding installations similar in material, design, and extent to that indicated for Project that has resulted in construction with a record of successful in-service performance.

1.5 PROJECT CONDITIONS

A. Weather Conditions: Proceed with siding installation only when existing and forecasted weather conditions will permit siding to be installed in compliance

with manufacturer's recommendations and when substrate is completely dry.

1.6 WARRANTY

A. Provide Manufacturer's lifetime non-prorated warranty covering product finish.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Alcoa Building Products.

2. CertainTeed Corp.; Vinyl Building Products Group. Chelsea Building Products

3. Gentek Building Products. Heartland Building Products.

2.2 POLYMERIC CLAPBOARD SIDING

A. Provide products made of profile extruded polyvinyl chloride with inorganic fillers as specified in this section:

1. Panel Thickness: 0.22" +/- 0.005"

2. Width: 8 7/16" +/- 1/16:

3. Exposure: 6 7/8"

4. Length: 12'

5. Finish: Low glass, rough cut cedar texture

6. Colors: To be selected by owner and architect

2.3 SOFFIT

A. Solid vinyl soffit and accessories complying with ASTM D 4477.

B. Pattern: 8-inch exposure in double 4-inch style.

C. Ventilation: Provide perforated soffit.

2.4 ACCESSORIES

A. Siding Accessories: Provide starter strips, edge trim, window head flashing, corner cap, and other items recommended by manufacturer for building configuration; match type of siding.

B. Decorative Accessories: Provide the following types of decorative accessories as indicated for a complete and proper installation, whether or not specifically shown on the drawings.

1. Corner posts

2. Door and window casings

3. Entrance and window head pediments Pilasters

4. Shutters Louvers Lattice Fasciae

5. Moldings and trim. Soffit trim

6. Misc. channels and dividers to suit project conditions Starter strip:

Galvanized Steel

C. Fasteners: Provide galvanized or other corrosion-resistant nails or staples as recommended by manufacture of siding and trim products

2.5 GABLE VENTS:

A. Gable vents shall be gable master solid co-polymer UV stabilized vinyl vents as manufactured by Mid-American Building Products. Sizes shall be as shown on the drawings and color shall be selected by the Architect from the manufacturer's standard colors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for substrates, installation tolerances, and other conditions affecting performance of siding. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION:

A. Clean substrates of projections and substrates detrimental to application.

B. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

3.3 INSTALLATION

A. Comply with siding manufacturer's installation instructions and recommendations. Center nails in elongated nailing slots without binding siding to allow for thermal movement. Install trim and accessories in accordance with manufacturer's recommendations. Overlap butt joints to shed water away from direction of prevailing wind. Isolate dissimilar metals.

1. Provide nailing area for attachment and blind nailing

2. Nail horizontal panels by placing nail through nailing channel area

3. Allow space between both ends of the siding panels and trim for thermal movement, butt the joint ends tight

4. Butt joints tightly and caulk or flash as desired or required by building code

5. Install siding into channels of channeled accessories or butt and caulk into other type accessories.

6. The base material shall be compounded so to provide the heat stability and weather exposure stability

7. A stacking mechanism for ease of installation

3.4 ADJUSTING

A. Replace damaged siding materials with new materials complying with specified requirements.

3.5 CLEANING:

A. Clean finished surfaces as recommended by siding manufacturer, and maintain in a clean condition during construction.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Metal Flashing and Counterflashing.

B. Gutters and Downspouts.

1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Furnish counterflashing receivers to Section 042113 - Brick Masonry.

B. Furnish shingle roof flashing to Section 073113 - Asphalt Shingles.

1.3 RELATED SECTIONS

A. Section 061000 – Rough Carpentry.

B. Section 073113 – Asphalt Shingles.

C. Section 099100 – Painting.

1.4 REFERENCES

A. Sheet Metal and Air Conditioning Contractors National Association (SMACNA) “Architectural Sheet Metal Manual”, Fourth Edition, 1987, is used as a reference standard for design, fabrication, and installation of flashing and sheet metal items.
   1. Plate numbers specified or indicated are from this standard.
   2. This standard is referred to as “SMACNA Manual”.

B. Steel Structures Painting Council (SSPC): Steel Structures Painting Manual”, Fourth Edition, 1985, is used as a reference standard for bituminous coating.

1.5 QUALITY ASSURANCE

A. Comply with SMACNA manual as minimum standard for materials, fabrication, and installation.

1.6 SUBMITTALS

A. Submit samples for color selection.

B. Submit Shop Drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Galvanized Steel: ASTM A525-84, G90 hot-dip galvanized, factory finished with Kynar 500 based coating.
   1. Color: As selected from manufacturer's standard colors.

B. Aluminum: ASTM B209-84a, alloy 3003, temper H14, factory finished with Kynar 500 based coating.

C. Solder: 50-50 tin/lead solder, ASTM B32-83, with rosin flux.

D. Fasteners: Same metal as sheet metal for fabricated item.

E. Epoxy Seam Sealer: Two-part noncorrosive metal seam cementing compound, recommended by manufacturer for exterior/interior non-moving joints.

F. Bituminous Coating: SSPC Paint 12.

G. Mastic Sealant: Polyisobutylene; non-hardening, non-skinning, non-drying, non-migrating sealant.

H. Building Paper: 15 lb. rosin-sized, unless otherwise indicated.

I. Fluoropolymer Coating: Kynar 500, manufactured by ELF Atochem America Inc., based coating.

2.2 FABRICATION

A. Form sections square, true and accurate in size, in maximum possible lengths and free of distortions and defects detrimental to appearance or performance. Hem exposed edges. Allow for expansion at joints.

B. Fabricate non-moving seams with flat-lock seams. For metal other than aluminum, tin

edges to be seamed, form seams, and solder. Form aluminum seams with epoxy seam sealer; rivet joints where additional strength is required.

C. Fabricate exposed sheet metal items of galvanized steel, prefinished with Kynar 500 based fluoropolymer coating.
   1. Provide prefinished aluminum where indicated on the Drawings.

D. When not indicated to be of higher gage, provide sheet metal of minimum gage as recommended in the SMACNA Manual.

E. Counterflashing: Similar to SMACNA Figure 4-4.

F. Gutters: Similar to Style A, SMACNA Figure 1-2, unless noted otherwise on Drawings.
   1. Provide hangers similar to SMACNA Figure 1-13A. (For half-round gutters, provide hangers similar to SMACNA Figure 1-20B.)
   2. Make expansion joints similar to SMACNA Figure 1-6.
   3. Provide water diverters as indicated on Drawings.

G. Downspouts: Similar to SMACNA Figure 1-32B. (For round downspouts, as indicated on Drawings, provide downspouts similar to SMACNA Figure 1-32A.)
   1. Provide hangers similar to SMACNA Figure 1-35H. (For round downspouts, as indicated on Drawings, provide downspouts similar to SMACNA Figure 1-35J.)
   2. Provide strainers similar to Figure D, SMACNA Plate 24.

H. Shingle Roof Flashing:
   1. Change of Slope: Similar to SMACNA Figure 4-7B.
   2. Valley: Similar to SMACNA Figure 4-10.
   3. Hip: Similar to SMACNA Figure 4-11E.
   4. Ridge: Similar to SMACNA Figure 4-11B.

I. Flashing at Roof Penetrations: Provide rubber boots with clamp.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify roof opening, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.

B. Verify membrane termination and base flashings are in place, sealed, and secure.

3.2 PREPARATION

A. Separate metal from non-compatible metal or corrosive surfaces by coating concealed surfaces with bituminous coating at points of contact.

B. Where aluminum is to be installed directly on cementitious or wood substrate, install a layer of building paper over substrate.

3.3 INSTALLATION

A. Set sheet metal items true to line and level as indicated.

B. Anchor sheet metal items securely in place, providing for thermal expansion. Conceal fasteners where possible.

C. Install work with laps, joints, and seams which will be permanently watertight and weatherproof.

D. Apply mastic sealant as shown in referenced SMACNA details.

END OF SECTION

SECTION 07 71 00

GUTTERS, DOWNSPOUTS, AND TRIM

PART 1 - GENERAL

1.1 SCOPE

A. This section includes requirements pertaining to sheet metal work for gutters and downspouts.

1. Gutters:

2. Downspouts:

B. Area of usage shall be as shown on the drawings.

1.2 SUBMITTALS

A. Prepare and submit shop drawings for all proposed work of this section.

B. Product data: Indicate product description, finishes and installation instructions including interface with adjacent materials and surfaces.

C. Samples: Submit manufactured expansion joint covers.

1.3 MANUFACTURERS

A. In order to define requirements for quality, function, sizes, gauges, grades, colors, etc. for manufactured products, the specifications for materials designate brand names of products that conform to minimum requirements that are acceptable.

1.4 COORDINATION WITH OTHER TRADES

A. When work is to be executed in conjunction with roofing and flashing products that are to be bonded by the roofing product manufacturer, the sheet metal work shall be coordinated and executed to permit required bonds to be obtained.

1.5 REFERENCE STANDARDS

A. Industry standards
1. Kaiser Aluminum Company, “Technical Information Architectural Aluminum

2. Aluminum Association, "Aluminum Sheet Metal Work in Building Construction"

B. ASTM Standards

1. Aluminum alloy sheet and plate: ASTM 8209- 73

2. Solder metal: ASTM 832- 70

1.6 WARRANTY

A. Warrant flashing and sheet metal work to be free of defects in materials and workmanship. Warranty period shall be one (1) year.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

A. Aluminum Sheet: ASTM B 209 (ASTM B 209M) , Alloy 3003, 3004, 3105, or 5005, Temper suitable for forming and structural performance required, but not less than H14, .032 inch thickness unless otherwise noted, finished as follows:

1. Mill Finish: One-side

2. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

a. Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2604 2605.

B. Gutters shall be K style (OGEE) fabricated from 0.027 inch thick material as manufactured by Spectra Metal Sales, Inc., 6104 Boat Rock Blvd. SW, Atlanta, GA and furnished with all necessary prefabricated components and accessories.

1. Gutter brackets shall be aluminum Supreme Screw on Hanger brackets as manufactured by Buchner Manufacturing Inc. Cutter support brackets shall be provided at 3 feet on center maximum. Manufacturer

information: Buchner Manufacturing Inc., 30004 Hwy 48, Pefferlaw, ON, LOE1NO, (705) 437-1734 .

C. Downspouts shall be rectangular corrugated aluminum fabricated from 0.032 inch thick material as manufactured by Spectra Metal Sales, Inc., 6104 Boat Rock Blvd. SW, Atlanta, GA and furnished to match gutters. Furnish all brackets, bends, offsets and accessories as required.

D. Break metal trim shall be fabricated from 0.027 inch thick material and furnished to match gutters.

E. Solder materials

1. Shall conform to ASTM 832, composition shall contain 50% tin and 50% lead except as specified otherwise.

2. Solder for aluminum and metal shall be of composition as recommended by metal manufacturer.

3. Solder flux: Muriatic acid neutralized with zinc for galvanized metal

F. Mastic: Meet ASTM 02822-82, fibrated asphalt flashing cement.

G. Fasteners: Same material or compatible with sheet metal being fastened

1. Nails: Flathead, needle point, not less than 12 gauge and of length to penetrate substrate 1" minimum

2. Expansion shields: Lead or bronze sleeves

3. Screws: Self-tapping type, with round heads

4. Bolts: Furnished complete with nuts and washers

5. Rivets:Round head type

6. Blind clips and cleats shall be the same gauge as sheet metal.

H. Caulk: Pecor, Corp.: BR-96, non-shrink, non-drying butyl caulk

2.2 DISSIMILAR MATERIALS

A. Where sheet metal abuts or members into adjacent dissimilar materials, execute juncture to prevent electrolysis between the two materials.

2.3 ACCESSORIES

A. Provide all accessories essential to complete sheet metal installation of same kind of material as item to which applied. Nails, screws and bolts shall be of types and of a composition that is compatible with metal.

B. Provide and install 16 inch by 30 inch precast concrete splash blocks as manufactured by Southern Cast Stone at all downspouts that empty on grade.

2.4 SHEET METAL FABRICATION:

A. Fabricate gutter system to conform to Figure 1-17A SMACNA 5th edition. Gutter shall be ogee shaped similar to Style K shown in Figure 1-2 SMACNA 5111 ed.

B. Downspouts shall be fabricated in accordance Figure 1-328 SMACNA 5111 edition. Provide downspout hangers fabricated in accordance with accordance Figure 1-35H SMACNA 5th edition. Locate downspout hangers 5 feet apart maximum, no more than 2 feet from the top and bottom of the downspout. Provide a minimum of 2 hangers per downspout.

C. Joints, end caps, and expansion joints in gutters and downspouts shall be made be the "Rivseal" procedure. Apply Gutterseal to the joint and then draw joint tight by blind riveting.

D. Provide expansion joints in gutters at 50 feet on center maximum.

PART 3 - EXECUTION

3.1 WORKMANSHIP

A. Except as otherwise shown or specified, workmanship of sheet metal, including method of forming joints, anchoring, cleating and provisions for expansion, shall conform to details and recommendations of the "Architectural Sheet Metal Manual" published by the Sheet Metal and Air Conditioning Contractors National Association.

3.2 CLEANING AND PROTECTION

A. Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration of finishes workmanship. Warranty period shall be one (1) year.

END OF SECTION

SECTION 07 84 13

PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Firestopping to prevent passage of flame or products of combustion through fire-rated assemblies.

1.2 RELATED SECTIONS

A. Section 092900 – Gypsum Board.

1.3 REGULATORY REQUIREMENTS

A. Provide wall and floor firestopping materials and installation, tested in accordance with Underwriter's Laboratories Through Penetration Firestop System Numbers CAJ-0032, CAJ-1020, CAJ-1081, CAJ-3045, WL-1027, WL-1039, WL-1063, WL-1064, WL-1065, WL-1087, WL-2023, WL-2036, WL-3023, WL-3034, WL-5043, WL-5044, WL-7001, WL-7002.

1.4 SUBMITTALS

A. Submit product data.

B. Submit manufacturer's installation instructions, including rate of application for substrate required by project.

C. Submit under provisions of Section 013300.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fire Resistant Compound – acceptable manufacturers include:
   1. Hilti Inc. – FS 600 series.
   2. United States Gypsum - Firecode Compound.
   3. Tremco Construction Products – Fyre-Shield.

B. Safing Insulation: 6 pound per cubic foot density.
   1. Acceptable manufacturers include:

a. United States Gypsum – Thermafiber Safing Insulation.
b. Dow Corning Corporation – Ceramic / Mineral Wool.
c. Standard Oil–Carborundum Co. – Fiberfrax ceramic fiber insulation.

2. Fire stop compound shall be SpecSeal Pillows, as manufactured by STI, or other U.L. Rated approved substitute.

C. Systems or devices listin the U.L. Fire Resistance Directory under categories XHCR and XHEZ may be used, providing that it conforms to the construction type, penetrant type, annular space requirements and fire rating involved in each separate instance and that the system is symmetrical for wall applications. Systems or devices must be asbestos free.

1. Additional requirements: Withstand the passage of cold smoke either as an inherent property of the system, or by the use of a separate product included as part of the U.L. system or device, and designed to perform this function.
2. Acceptable manufacturers and products: Those listed in the U.L. Fire Resistance Directory for the U.L. system involved and as further defined in the Firestopping User's Guide by Specified Technologies Inc. (STI).
3. All firestopping products must be from a single manufacturer. All trades shall use products from the same manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fire barrier caulk around pipes, conduits, and other objects penetrating fire-rated assemblies.

B. Pack safing insulation in holes through floors and rated walls, and around pipes, conduits, ductwork and other objects penetrating fire-rated assemblies, where fire barrier caulk can not be used.

C. Pack safing insulation, to full depth of slab or wall, at perimeter openings between floor slab and exterior wall. Fill voids within double- or triple-stud assemblies.

D. Install in accordance with manufacturer's recommendations and UL System Numbers.

E. Install firestops without gaps or voids.

F. Securely fasten safing insulation with clips, wire mesh or other suitable non-combustible material.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Preparing sealant substrate surfaces.

B. Sealant and joint backing for exterior and interior joints.

C. Sealant for horizontal traffic-bearing joints.

D. Caulk for interior joints.

1.2 RELATED SECTIONS

A. Section 042113 – Brick Masonry.

B. Section 076200 – Sheet Metal Flashing and Trim.

C. Section 092900 – Gypsum Board.

1.3 SUBMITTALS

A. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, colors available.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Submit product data for each type of sealant and caulk.

C. Submit samples of sealant for color selection.

D. Submit manufacturer’s surface preparation and installation instructions.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Maintain temperature and humidity recommended by the sealant manufacturer during

and after installation.

PART 2 - PRODUCTS

2.1 SEALANT

A. Sealant, Except for Traffic-Bearing Joints: One of the following:
   1. Dynatrol II, manufactured by Pecora Corporation.
   2. Dymeric, manufactured by Tremco.
   3. Sonolastic NP2, manufactured by Sonneborn Building Products.

B. Sealant for Traffic-Bearing Joints: One of the following:
   1. Urexpan NR-200 manufactured by Pecora Corporation.
   2. THC-900 manufactured by Tremco.
   3. Vulkem 245, manufactured by Mameco.
   4. Sonolastic SL2, manufactured by Sonneborn Building Products.

C. Colors as selected.
   1. A maximum of two will be used.

2.2 CAULK

A. One of the following:
   1. AC-20 manufactured by Pecora Corporation.
   2. Acrylic Latex Caulk manufactured by Tremco.
   3. Sonolac, manufactured by Sonneborn Building Products.

B. Color: White, paintable.

2.3 ACCESSORIES

A. Primer: Non-staining type recommended by sealant manufacturer to suit application.

B. Joint Filler: Compressible, closed cell polyethylene foam rod, or other material recommended by sealant manufacturer to suit application, oversized 30 to 50 percent.

C. Bond Breaker: Pressure sensitive polyethylene tape or other plastic tape recommended by sealant manufacturer to suit application.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Verify that substrate surfaces and joint openings are ready to receive work.

B. Remove loose materials and foreign matter that might impair adhesion of sealant.

C. Verify that joint backing and release tapes are compatible with sealant.

D. Examine joint dimensions and size materials to achieve required width/depth ratios.

3.2 INSTALLATION

A. Install sealant in accordance with manufacturer's instructions.

B. Apply bond-breaker where required by manufacturer’s recommendations.

C. Set joint filler at depths to provide sealant as follows:
   1. For sealant joints not subject to traffic, provide sealant depth equal to 50 percent of joint width, but neither more than 1/2” not less than 1/4” deep.
   2. For sealant joints subject to traffic, provide sealant depth equal to 75 percent of joint width, but neither more than 5/8” nor less than 3/8” deep.
   3. For caulk joints, provide caulk depth in range of 75 to 125 percent of joint width.

D. Ensure joint are free of gaps or air pockets, foreign embedded matter, ridges, and sags.

E. Tool joints concave.

END OF SECTION

SECTION 08 13 13

HOLLOW METAL DOORS

Part 1 - GENERAL

1.1 SECTION INCLUDES

A. Side-hinged steel door systems.

1.2 PRODUCTS

A. Door system components include (as required): door panel(s), sidelite panel(s), glass inserts, door frame, hinges, weather seals.

1.3 BUILDING CODE & REGULATORY COMPLIANCE

A. Fire Resistance: Provide unit(s) scheduled for installation in openings requiring compliance with national, state or local fire guidelines as required.

B. Structural Performance & Impact Rating: Provide unit(s) scheduled for installation in openings requiring compliance with national, state or local wind load and/or missile impact resistance as required.

C. Thermal Performance: Provide unit(s) scheduled for installation in openings requiring compliance with national, state, or local thermal resistance and/or solar heat gain as required. Provide unit(s) with U-Factor & SHGC ratings in accordance with the International Energy Conservation Code (IECC) and/or the National Fenestration Rating Council (NFRC) as required. Provide unit(s) with ENERGY STAR compliance / labeling as required.

D. Acoustical Performance: Provide unit(s) scheduled for installation in openings requiring a specified noise control rating as required.

E. General Performance: Provide all door systems designed to comply with water penetration guidelines in accordance with ASTM E331 and/or Florida Building Code TAS202; air infiltration guidelines in accordance with ASTM E283 and/or Florida Building Code TAS202; forced entry resistance guidelines in accordance with Florida Building Code TAS202.

1.4 DELIVERY, STORAGE & HANDLING

A. Delivery: Reasonable care shall be exercised during shipping and handling in keeping with the decorative nature of product.

B. Storage & Protection: Store upright in a dry, well ventilated building or shelter at a constant temperature. Do not store in damp areas or freshly plastered buildings. Place units on wood blocks at least 2" high to prevent moisture at threshold and/or possible damage. Do not place in non-vented plastic or canvas shelters.

1.5 WARRANTY

A. Manufacturer warrants the panel to be free of manufacturing defects in material and workmanship for 15-years. Please check with manufacturer or distributor for current warranty terms and conditions.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Basis of design: Masonite HD steel-edge steel doors.

B. Submit other manufacturers' equivalents under the provisions of Section 16000.

2.2 HOLLOW METAL DOORS

A. Door Panel: Steel-edge steel doors shall be fabricated using 4-piece construction that includes primed white 0.0215" (+/-0.0015) hot dipped galvanized strike side and hinge side steel facings, coated with multiple protective chemical layers to promote paint adhesion and deter corrosion. Top rail is finger jointed wood or steel channel. Composite bottom rail is moisture and decay resistant. Lock areas reinforced for single and double bore configurations. Door facings are to be interlocked together utilizing plastic thermal break forming a mechanical bond. Insulated core to be poured-in-place, high performance polyurethane foam (2.0 pcf minimum) forming a secure attachment to all door components.

B. Bottom rail may be machined to accept weather seal. Mounting surface for latching hardware to be reinforced with solid internal blocking. Hinge preparations with 12 gauge reinforcement plate are to be placed at manufacturer's specifications and are to be machined for standard weight full mortise 4" butt hinges. Latch preparations are to be placed at manufacturer's specifications. Face bore(s) for cylindrical lock and deadbolt are to be 2-1/8" diameter at 2-3/4" or 2-3/8" backset and 5-1/2" on center (5-1/2" or 10-1/2" on 8'0" panels).

C. Glass Insert: Insulated glass inserts shall be fabricated in 1/2" double pane or 1" triple pane construction. Glass frame may be "lip lite" design in rigid plastic or cellular vinyl.

D. Door Frame: Wood frames shall be fabricated as a single rabbet jamb design. Hinge jamb(s), strike jamb, head jamb, and mullion(s) shall be machined to accept a kerf applied weather seal. Hinge jamb preparations are to be placed at manufacturer's specifications and are to be machined for standard weight full mortise 4" butt hinges. Strike jamb preparations are to be placed at manufacturer's specifications and are to be machined for full lip cylindrical strike plate. Inswing or bumper outswing threshold shall be high-dam design. Low profile threshold shall be required for handicap accessible openings. Double door units shall include a t-astragal attached to the "passive" panel with top and bottom flush bolts that securely strike into the head jamb and threshold.

E. Hinges: (3) standard weight full mortise 4" butt hinges are required on doors 7'0" height or smaller & (4) on doors greater than 7'0".

D. Weather Seal: Door frame shall be fabricated featuring a vinyl wrapped foam filled compression design that is kerf installed. Corner seals shall be installed to the rabbet section of the door frame at the bottom of the hinge and lock jamb. Door bottom sweep shall be sealed and securely attached to the operable door panel(s).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of substrate conditions, which have been previously completed, are acceptable for the product installation instructions in accordance with manufacturer's specifications. Verify that door frame openings are constructed plumb, true and level before beginning installation process. Select fasteners of adequate type, number and quality to perform the intended functions.

3.2 INSTALLATION

A. Remove protective packaging just prior to installation. Installer shall be experienced in performing work required and shall be specialized in the installation of work similar to that required for this project. Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product packaging instructions for installation.

3.3 FLASHING, INSULATING & TRIMMING

A. Exterior of installed unit shall be flashed, trimmed & sealed to prevent air infiltration and/or water penetration. Interior of installed unit shall be insulated & trimmed to prevent thermal and/or acoustical transmission.

3.4 FINISHES

A. Various types of materials are used in the construction of the door system; each shall be sealed in accordance with manufacturer's specifications to protect against various environmental conditions. Make sure to seal and inspect all 5-surfaces (top, hinge side, lock side, exterior face and interior face) of the active door panel(s). Finishing and/or re-finishing must be completed within 45-days from the time the protective packaging was removed and/or the installation was performed. Conduct periodic inspections of all coated surfaces to insure that door components are not exposed. Inspections should occur at least once a year. Reseal the surface as needed.

END OF SECTION

SECTION 081400

WOOD DOORS

Part 1 - GENERAL

1.1 SECTION INCLUDES

A. Side-hinged wood door systems.

1.2 PRODUCTS

A. Door system components include (as required): door panel(s), door frame, hinges.

1.3 BUILDING CODE & REGULATORY COMPLIANCE

A. Fire Resistance: Provide unit(s) scheduled for installation in openings requiring compliance with national, state or local fire guidelines as required.

1.4 DELIVERY, STORAGE & HANDLING

A. Delivery: Reasonable care shall be exercised during shipping and handling in keeping with the decorative nature of product.

B. Storage & Protection: Store upright in a dry, well ventilated building or shelter at a constant temperature. Do not store in damp, freshly plastered, drywall or concrete areas until materials have completely dried. Doors should be stored at least 10’ away from any heat source to help prevent uneven drying. Doors must be sealed with an oil-based sealer or primer if stored for long periods.

1.5 WARRANTY

A. Manufacturer warrants the panel to be free of manufacturing defects in material and workmanship for 1-year. Please check with manufacturer or distributor for current warranty terms and conditions.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Basis of design: Masonite Flush solid-core doors.

B. Submit other manufacturers’ equivalents under the provisions of Section 16000.

2.2 FLUSH WOOD DOORS

A. Door Panel: Flush doors shall be fabricated using loose lay up assembly that includes wood veneer or hardboard facings, wood stiles, wood or MDF rails and stave lumber core. Door facings are to be bonded to stiles, rails and core forming a 3-ply structural attachment.

B. Hinge preparations for 1-3/8” thick doors to be machined for standard weight radius mortise 3-1/2” hinges and 1-3/4” thick doors to be machined to accept 4” hinges. Face bore(s) for cylindrical lock and deadbolt are to be 2-1/8” diameter at 2-3/4” or 2-3/8” backset.

C. Vertical edge of door to be square, beveled both sides or lock stile only. Edge preparation should be clearly noted when the product is ordered.

D. Door Frame: Wood jambs shall be fabricated as a flat jamb with doorstop applied or 2-piece split jamb. Hinge jamb preparations for 1-3/8” thick doors to be machined for standard weight radius mortise 3-1/2" hinges and 1-3/4” thick doors to be machined to accepts 4” hinges. Strike jamb preparations are to be machined for full lip cylindrical strike plate. Double door units shall include preparations for ball catch located at the top of door on both door panels designed to strike into the head jamb.

E. Hinges: (3) standard weight radius mortise hinges are required on doors 7’0” height or smaller & (4) on doors greater than 7’0”.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of substrate conditions, which have been previously completed, are acceptable for the product installation instructions in accordance with manufacturer’s specifications. Verify that door frame openings are constructed plumb, true and level before beginning installation process. Select fasteners of adequate type, number and quality to perform the intended functions.

3.2 INSTALLATION

A. Remove protective packaging just prior to installation. Installer shall be experienced in performing work required and shall be specialized in the installation of work similar to that required for this project. Comply with manufacturer’s product data, including product technical bulletins, product catalog installation instructions and product packaging instructions for installation.

3.3 FINISHES

A. Follow manufacturer's recommendations for painting or staining. Various types of materials are used in the construction of the door system; each shall be sealed in accordance with manufacturer's specifications to protect against various environmental conditions. Make sure to completely seal and inspect all 6-surfaces (top, hinge side, bottom, lock side, front face and back face) with two coat minimum on operable panel(s). Finishing and/or re-finishing must be completed immediately after door has acclimated to the environment where it is to be installed and within a maximum of 7 days. Avoid finishing after a rain or damp and during periods of higher than average humidity. Conduct periodic inspections of all coated surfaces to insure that door components are not exposed. Inspections should occur at least once a year. Reseal the surface as needed.

END OF SECTION

SECTION 08 31 13

ACCESS DOORS AND FRAMES

PART 1- GENERAL

1.1 SECTION INCLUDES

A. Manual disappearing stairways.

1.2 REFERENCES

A. ANSI A14.9: Safety Requirements for Ceiling Mounted Disappearing Climbing Systems.

1.3 SUBMITTALS

A. Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

B. Shop Drawings for Stairs:
1. Plan and section of stair installation.
2. Indicate rough opening dimensions for ceiling and/or roof openings.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store stairway until installation inside under cover in manufacturer's unopened packaging. If stored outside, under a tarp or suitable cover.

1.5 WARRANTY

A. Limited Warranty: One year against defective material and workmanship, covering parts only. Defective parts, as deemed by the manufacturer, will be replaced at no charge, freight excluded, upon inspection at manufacturer's plant.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Precision Ladders, LLC, P. O. Box 2279; Morristown, TN 37816-2279; Tel: 423-586-2265; Fax: 423-586-2091; www.PrecisionLadders.com

B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 MANUAL DISAPPEARING STAIRWAY.

A. Manual Disappearing Stairway.
1. Standard Model: Super Simplex Disappearing Stairway as manufactured by Precision Ladders LLC. Stairs for ceiling heights 7’-0” – 12’-0”: Model 1000 (ceiling height in

inches). Stairs for ceiling heights 12’-1” – 13’-6”: Model 2000 (ceiling height in inches).

B. Performance Standard: Unit shall comply with ANSI A14.9, Commercial Type, for rough openings between 27 inches to 39 inches. Residential Type for rough openings between 22-1/2” and 27”. Stairway capacity shall be rated at 500 lbs.

C. Accessories:

1. Steel pole to aid opening and closing stairways.
2. Stairs for ceiling heights 9’ -10” – 12’ -0” shall be equipped with a patented Precision Fold Assist to aid in folding and unfolding of sections. Stairs for ceiling heights 12’ 1” – 13’6” shall be equipped with 2 Fold Assists. Precision Fold-Assist is optional on stairways for ceiling heights of 9’ 9” and below.
3. Keyed lock for door (standard on fire-rated models, optional on non-fire-rated models).

D. Components:

1. Ceiling Opening
    a. Ceiling height of 9’ 9” or less requires an opening of 30” x 54”
    b. Ceiling heights from 9’ 10” – 12’ 0” require opening of 30” x 64”
    c. Ceiling heights from 12’ 1” – 13’ 6” require opening of 22 ½” x 72”
2. Stairway Stringer: 6005-T5 Extruded aluminum channel 5” x 1” x 1/8”; tri-fold design; steel blade type hinges; adjustable feet with plastic Mar-guard. Pitch shall be 63°.
3. Stairway Tread: 6005-T5 extruded aluminum channel 5 3/16 inches by 1 1/4 inches by 1/8 inch. Depth is 5 3/16 inches. Deeply serrated top surface. Riser Height: 9-1/2 inches. Clear Tread Width for Standard Width: 18 inches.
4. Railing: Aluminum bar handrail riveted to stringers, upper section only.
5. Frame:
    a. If ceiling to floor (or roof deck) above is under 12”, frame shall be 1/8” steel formed channel, box.
    b. When ceiling to floor (or roof deck) above is 12” or greater, the frame shall be 1/8” steel, 63° (with built-in steps) on the hinge end, 90° on the other end, custom depth to fill distance from ceiling to floor above. This custom frame will require a longer opening in the floor above than is required at the ceiling level.
6. Door Panel
    a. Standard (non-fire rated) door shall be constructed of 1/8 inch (3 mm) aluminum sheet attached to stairway frame with a steel piano hinge. Door overlaps bottom flange of frame. Eye bolt accommodates pole for opening and closing door.
    b. On fire-rated models, the door panel shall be constructed of 20 gauge steel and have a 2 hour fire rating for use in fire-rated ceiling assemblies as issued by Warnock-Hersey or other appropriate independent testing/licensing agency.
7. Hardware:
    a. Steel blade type hinge connecting stringer sections. Zinc plated and chromate sealed.
    b. Steel operating arms, both sides. Zinc coat with clear trivalent chromate.
    c. Double acting steel springs and cable, both sides.

d. Rivets rated at 1100 lb (499 kg) shear strength each.
e. Steel section alignment clips at stringer section joints.
f. Molded rubber guards at corners of aluminum door panel.

8. Finishes: Mill finish on aluminum stairway components. Prime coat on frame.

2.3 FABRICATION

A. Completely fabricate ladder ready for installation before shipment to the site.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until rough opening and structural support have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Examine materials upon arrival at site. Notify the carrier and manufacturer of any damage.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.3 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 08 42 29

AUTOMATIC ENTRANCES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Operators for doors provided in other sections.

B. Controllers, actuators and safety devices.

C. Maintenance.

1.02 RELATED REQUIREMENTS

A. Section 28 13 00 - Access Control: Connection to access control system; access control devices used as actuators.

B. Section 28 31 00 - Fire Detection and Alarm: Connection to fire alarm system.

1.03 REFERENCE STANDARDS

A. BHMA A156.10 - American National Standard for Power Operated Pedestrian Doors; Builders Hardware Manufacturers Association; 2011 (ANSI/BHMA A156.10).

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

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings:
   1. Indicate layout and dimensions; head, jamb, and sill conditions; elevations; components, anchorage, recesses, materials, and finishes, electrical characteristics and connection requirements.
   2. Identify installation tolerances required, assembly conditions, routing of service lines and conduit, and locations of operating components and boxes.

C. Product Data: Provide data on system components, sizes, features, and finishes.

D. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and manufacturer's hardware and component templates.

E. Maintenance Data: Include manufacturer's parts list and maintenance instructions for each type of hardware and operating component.

F. Warranty: Submit manufacturer warranty and ensure that forms have been completed 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 60 00 - Product Requirements, for additional provisions.
   2. Wrenches and other tools required for maintenance of equipment.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years of experience.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide two year manufacturer warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Swinging Automatic Entrance Door Assemblies:
   1. ASSA ABLOY Entrance Solutions; Besam SW200i: www.besam-usa.com.
   2. Horton Automatics; _____: www.hortondoors.com.
   3. Portalp USA; ISO Series: www.portalpusa.com.
   4. record-usa; 6100 Series (Low-Energy): www.record-usa.com.
   5. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 POWER OPERATED DOORS

A. Power Operated Doors: Provide products that comply with the requirements of the authorities having jurisdiction; unless otherwise indicated, provide equipment selected for the actual weight of the doors and for light pedestrian traffic.
   1. Swinging Door Operators: Fully adjustable for opening and closing speeds, checking speeds, and hold-open time; in the event of power failure, disengage operator allowing door to function as a door with a spring closer.
   2. Exterior Swinging Doors: Provide equipment capable of operating, closing, and holding closed under positive and negative differential pressure; if necessary, provide power closing.
   3. Exterior and Vestibule Doors: Provide equipment suitable for operating temperature range of minus 20 to plus 140 degrees F (minus 7 to plus 60 degrees C) ambient.

B. Swinging Doors with Full Power Operators: Comply with BHMA A156.10; safeties required.

2.03 OPERATORS FOR SWINGING DOORS PROVIDED BY OTHERS

A. Door Operator: Electric, surface mounted overhead.
   1. Operation: Full-power open, spring close operation.
   2. Variable speed control for opening and closing cycles.
   3. "Push" Side Actuator: Mat switch.
   4. "Pull" Side Actuator: Mat switch.
   5. "Pull" Side Safety: Door-mounted.
   6. Hold Open: Toggle switch at inside head of doors; deactivate hold-open on activation of fire alarm system.

2.04 CONTROLLERS, ACTUATORS, AND SAFETIES

A. Controller: Provide microprocessor operated controller for each door.

B. Comply with BHMA A156.10 for actuator and safety types and zones.

C. Push Plate Actuator: Standard wall mounted, surface mounted momentary contact type; satin stainless steel plate; 5 inches (____ mm) diameter; labeled PUSH.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work and dimensions are as indicated on shop drawings.

B. Verify that electric power is available and is of the correct characteristics.

3.02 INSTALLATION

A. Install equipment in accordance with manufacturer's instructions.

3.03 ADJUSTING

A. Adjust door equipment for correct function and smooth operation.

3.04 CLEANING

A. Remove temporary protection, clean exposed surfaces.

3.05 CLOSEOUT ACTIVITIES

A. Demonstrate operation, operating components, adjustment features, and lubrication requirements.

3.06 MAINTENANCE

A. Provide service and maintenance of operating equipment for one year from Date of Substantial Completion, at no extra charge to Owner.

END OF SECTION

SECTION 08 43 13

ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aluminum-framed storefront, with vision glass.

B. Aluminum doors and frames.

C. Weatherstripping.

D. Door hardware.

1.02 RELATED REQUIREMENTS

A. Section 05 12 00 - Structural Steel Framing: Steel attachment members.

B. Section 05 50 00 - Metal Fabrications: Steel attachment devices.

C. Section 07 25 00 - Weather Barriers: Sealing framing to weather barrier installed on adjacent construction.

D. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.

E. Section 08 42 29 - Automatic Entrances.

F. Section 08 71 00 - Door Hardware: Hardware items other than specified in this section.

G. Section 08 80 00 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; American Architectural Manufacturers Association; 2012.

B. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; American Architectural Manufacturers Association; 2012.

C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.

D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

E. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).

F. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.

G. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details.

C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.

D. Samples: Submit two samples 4 inches (____x____ mm) in size illustrating finished aluminum surface, glass, infill panels, glazing materials.

E. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.

F. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.

G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed at the State in which the Project is located.

B. Manufacturer and Installer Qualifications: Company specializing in manufacturing aluminum glazing systems with minimum three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.08 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C). Maintain this minimum temperature during and 48 hours after installation.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a five year period after the Date of Substantial Completion.

C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Aluminum-Framed Storefront and Doors:
   1. Coral Architectural Products, a division of Coral Industries, Inc: www.coralap.com.
   2. C.R. Laurence Co., Inc; U.S. Aluminum: www.crl-arch.com.
   3. Kawneer North America; www.kawneer.com.
   4. Oldcastle BuildingEnvelope; www.oldcastlebe.com.
   5. Tubelite, Inc; www.tubeliteinc.com.
   6. Trulite Glass & Aluminum Solutions, LLC; CG450, 1-3/4 by 4-1/2 inch, center-set, single glazed, non-thermal, with 200 series narrow-stile doors: www.trulite.com.
   7. United States Aluminum Corp;www.usalum.com.
   8. YKK AP America Inc; www.ykkap.com.
   9. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 STOREFRONT

A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Glazing Rabbet: For 1 inch (25 mm) insulating glazing.
   2. Glazing Position: Centered (front to back).
   3. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep (50 mm wide by 114 mm deep).

4. Finish: To be selected by architect.
    a. Factory finish all surfaces that will be exposed in completed assemblies.
    b. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
5. Finish Color: As selected by Architect from manufacturer's standard line.
6. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
7. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
8. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
9. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F (95 degrees C) over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
10. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
11. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

B. Performance Requirements:
1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
    a. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
2. Water Penetration Resistance: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 8 psf (390 Pa).
3. Air Leakage: Maximum of 0.06 cu ft/min sq ft (0.3 L/sec sq m) of wall area, when tested in accordance with ASTM E283 at 6.27 psf (300 Pa) pressure differential across assembly.

2.03 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
1. Glazing Stops: Flush.

B. Glazing: As specified in Section 08 80 00.

C. Swing Doors: Glazed aluminum.
1. Thickness: 1-3/4 inches (43 mm).
2. Top Rail: 4 inches (100 mm) wide.
3. Vertical Stiles: 4-1/2 inches (115 mm) wide.
4. Bottom Rail: 10 inches (254 mm) wide.
5. Glazing Stops: Square.
6. Finish: Same as storefront.

2.04 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Fasteners: Stainless steel.

C. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

2.05 FINISHES

A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils (0.018 mm) thick.

B. Color: As selected by Architect from manufacturer's standard range.

2.06 HARDWARE

A. For each door, include weatherstripping, sill sweep strip, and threshold.

B. Other Door Hardware: Storefront manufacturer's standard type to suit application.
   1. For each door, include butt hinges, pivots, push handle, pull handle, exit device, narrow stile handle latch, and closer.

C. Automatic Door Operators and Actuators: As specified in Section 08 42 29.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.

B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.

H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

I. Set thresholds in bed of sealant and secure.

J. Install hardware using templates provided.
   1. See Section 08 71 00 for hardware installation requirements.
   2. See Section 08 42 29 for operator and actuator installation requirements.

K. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inches every 3 ft (1.5 mm/m) non-cumulative or 1/16 inches per 10 ft (1.5 mm/3 m), whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch (0.8 mm).

3.04 ADJUSTING

A. Adjust operating hardware and sash for smooth operation.

3.05 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

3.06 PROTECTION

A. Protect installed products from damage during subsequent construction.

END OF SECTION

SECTION 08 53 13

VINYL WINDOWS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Vinyl single-hung windows.

1.2 RELATED SECTIONS

A. Section 072500 – Weather Barriers.

B. Section 079200 – Joint Sealants: Sealants and caulking.

1.3 REFERENCES

A. American Architectural Manufacturers Association (AAMA):
1. AAMA 502 – Voluntary Specification for Field Testing of Windows and Sliding Doors.

B. ASTM International:
1. ASTM C 1036 – Flat Glass.
2. ASTM C 1048 – Heat-Treated Flat Glass--Kind HS, Kind FT Coated and Uncoated Glass.
3. ASTM D 3656 – Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns.
4. ASTM E 283 – Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Difference Across the Specimen.
5. ASTM E 547 – Water Penetration of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Differential.

C. Screen Manufacturers Association (SMA):
1. SMA 1201 – Specifications for Insect Screens for Windows, Sliding Doors and Swinging Doors.

D. Window and Door Manufacturers Association (WDMA):
1. ANSI/AAMA/NWWDA 101/I.S.2 – Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors.

1.4 PERFORMANCE REQUIREMENTS

A. Windows shall meet Rating HS-R specifications in accordance with ANSI/AAMA/NWWDA 101/I.S.2.

B. Window Air Leakage, ASTM E 283: Window air leakage when tested at 1.57 psf (25 mph) shall be 0.25 cfm/ft^2 of frame or less.

C. Window Water Penetration, ASTM E 547: No water penetration through window when tested under static pressure of 4.5 psf (42 mph) after 4 cycles of 5 minutes each, with water being applied at a rate of 5 gallons per hour per square foot.

1.5 SUBMITTALS

A. Comply with Division 1 requirements.

B. Product Data: Submit manufacturer's product data, including installation instructions.

C. Shop Drawings: Submit manufacturer's shop drawings, indicating dimensions, construction, component connections and locations, anchorage methods and locations, hardware locations, and installation details.

D. Samples: Submit full-size or partial full-size sample of vinyl single-hung windows illustrating glazing system, quality of construction, and color of finish.

E. Warranty: Submit manufacturer’s standard warranty.

1.6 QUALITY ASSURANCE

A. Mockup:
   1. Provide sample installation for field testing window performance requirements and to determine acceptability of window installation methods.
   2. Approved mockup shall represent minimum quality required for the Work.
   3. Approved mockup shall [not] remain in place within the Work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site undamaged in manufacturer's or sales branch's original, unopened containers and packaging, with labels clearly identifying manufacturer and product name. Include installation instructions.

B. Storage:
   1. Store materials in accordance with manufacturer's instructions.

2. Store materials off ground and under cover.
3. Protect materials from weather, direct sunlight, and construction activities.

C. Handling: Protect materials and finish during handling and installation to prevent damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of design: Pella Corporation, Encompass windows.

B. Submit other manufacturers' equivalents under the provisions of Section 016000.

2.2 VINYL SINGLE-HUNG WINDOWS

A. Vinyl Single-hung Windows:
1. Factory-assembled windows with sash installed in frame.
2. Frame and Sash Material: Extruded, rigid polyvinylchloride (PVC).

B. Frame:
1. Type: 10 Series with integral fin.
2. Overall Frame Depth: 2-11/16 inches for 1-5/8-inch wall depth.
3. Nominal Wall Thickness, Vinyl Members: 0.065 inch to 0.075 inch.
4. Frame Corners:
   a. Mitered.
   b. Heat-fused, fully welded corners.
5. Sill: Fitted with weeps.

C. Sash:
1. Vent Sash: Removable for cleaning exterior glass.
2. Sash Corners:
   a. Mitered.
   b. Heat-fused, fully welded corners.

D. Glazing:
1. Float Glass: ASTM C 1036, Quality 1.
   a. Tempered Glass: ASTM C 1048.
2. Type: Exterior face-glazed, 3/4-inch, sealed insulating glass.
   a. Multi-layer, low-E coated, glass with argon.
   b. Provide tempered glass at locations as required.
3. Glazing units to meet Energy Star v3 requirements.
   a. U-Value = .32

b. SHGC = .40

E. Weather Stripping:
1. Vent Sash: Fin-type, pile around perimeter.

2.3 OPTIONS

A. Grilles:
1. Profile: 3/4-inch contoured.
2. Type: Aluminum grilles-between-the-glass.
3. Finish: Factory finished.
a. Color: Match window frame.

B. Insect Screens:
1. Compliance:
a. ASTM D 3656.
b. SMA 1201.
2. Screen Cloth: Half-size with black, vinyl-coated, 18/14 mesh, fiberglass screen cloth set in aluminum frame fitted to window exterior.
3. Complete with necessary hardware.
4. Screen Frame Finish: Baked enamel.
a. Color: Match window exterior.

2.4 HARDWARE

A. Balances:
1. Galvanized steel block-and-tackle balances concealed with frame jamb.
2. Polyester Cords: Connect balance to sash.

B. Lock:
1. Type: Factory-installed, zinc-die-cast, self-aligning, cam-action lock on meeting rail.
2. Windows with Frame Width 29-1/2 Inches or Greater: 2 locks.
3. Color: Match window interior.

C. Limited Opening Hardware:
1. Nominal Opening: 3-3/4 inches.
2. Extruded vinyl.
3. Color: Match window interior.

2.5 TOLERANCES

A. Windows shall accommodate the following opening tolerances:

1. Horizontal Dimensions Between High and Low Points: Plus 1/4 inch, minus 0 inch.
2. Width Dimensions: Plus 1/4 inch, minus 0 inch.
3. Building Columns or Masonry Openings: Plus or minus 1/4 inch from plumb.

2.6 FINISH

A. Window Frame and Sash Vinyl Extrusions: Integral color throughout profile.

B. Exposed Surfaces: Smooth, glossy, and uniform in appearance.

C. Color: To be selected from manufacturer's standard colors.

2.7 INSTALLATION ACCESSORIES

A. Flashing/Sealant Tape:
1. Aluminum-foil-backed butyl window and door flashing tape.
2. Maximum Total Thickness: 0.013 inch.
3. UV resistant.
4. Verify sealant compatibility with sealant manufacturer.

B. Interior Insulating-Foam Sealant: Low-expansion, low-pressure polyurethane insulating window and door foam sealant.

C. Exterior Perimeter Sealant: "Pella Window and Door Installation Sealant" or equivalent high quality, multi-purpose sealant as specified in the joints sealant section.

D. Jamb Extensions: Factory-applied, primed-wood jamb extensions as required for wall depth.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive vinyl single-hung windows. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Install vinyl single-hung windows in accordance with manufacturer's instructions.

B. Install vinyl single-hung windows to be weather-tight and freely operating.

C. Maintain alignment with adjacent work.

D. Secure assembly to framed openings, plumb and square, without distortion.

E. Integrate vinyl single-hung window installation with exterior weather-resistant barrier using flashing/sealant tape. Apply and integrate flashing/sealant tape with weather-resistant barrier using watershed principles in accordance with window manufacturer's instructions.

F. Seal vinyl single-hung windows to exterior wall cladding with sealant and related backing materials at perimeter of assembly.

G. Place interior seal around vinyl single-hung window perimeter to maintain continuity of building thermal and air barrier using insulating-foam sealant.

H. Leave vinyl single-hung windows closed and locked.

3.3 FIELD QUALITY CONTROL

A. Field Testing: Field test vinyl single-hung windows in accordance with AAMA 502, Test Method A.

3.4 CLEANING

A. Clean vinyl single-hung windows in accordance with manufacturer's instructions.

B. Do not use harsh cleaning materials or methods that would damage finish or glass.

C. Remove labels and visible markings.

D. Keep window tracks clear of dirt and debris.

E. Keep weep holes open and clear of obstructions.

3.5 PROTECTION

A. Protect installed vinyl single-hung windows to ensure that, except for normal weathering, windows will be without damage or deterioration at time of substantial completion.

END OF SECTION

SECTION 08 54 13

FIBERGLASS WINDOWS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fiberglass single-hung windows.

1.2 RELATED SECTIONS

A. Section 072500 – Weather Barriers.

B. Section 079200 – Joint Sealants: Sealants and caulking.

1.3 REFERENCES

A. American Architectural Manufacturers Association (AAMA):
1. AAMA 502 - Voluntary Specification for Field Testing of Windows and Sliding Doors.
2. AAMA 613 - Voluntary Performance Requirements and Test Procedures for Organic Coatings on Plastic Profiles.

B. American Society for Testing and Materials (ASTM):
1. ASTM C 1036 - Flat Glass.
2. ASTM C 1048 - Heat-Treated Flat Glass--Kind HS, Kind FT Coated and Uncoated Glass.
3. ASTM D 3656 - Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns.
4. ASTM E 283 - Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Difference Across the Specimen.
5. ASTM E 547 - Water Penetration of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Differential.

C. Screen Manufacturers Association (SMA):
1. SMA 1201 - Specifications for Insect Screens for Windows, Sliding Doors and Swinging Doors.

D. Window and Door Manufacturers Association (WDMA):
1. ANSI/AAMA/NWWDA 101/I.S.2 - Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors.

1.4 PERFORMANCE REQUIREMENTS

A. Windows shall meet Rating H-LC30-50 specifications in accordance with ANSI/AAMA/NWWDA 101/I.S.2.

B. Window Air Leakage, ASTM E 283: Window air leakage when tested at 1.57 psf (25 mph) shall be 0.25 cfm/ft^2 of frame or less.

C. Window Water Penetration, ASTM E 547: No water penetration through window when tested under static pressure of 4.5 psf (42 mph) after 4 cycles of 5 minutes each, with water being applied at a rate of 8 gallons per hour per square foot.

1.5 SUBMITTALS

A. Submit in accordance with Division 1 requirements.

B. Product Data: Submit manufacturer's product data, including installation instructions.

C. Shop Drawings: Submit manufacturer's shop drawings, indicating dimensions, construction, component connections and locations, anchorage methods and locations, hardware locations, and installation details.

D. Samples: Submit full-size or partial full-size sample of window illustrating glazing system, quality of construction, and color of finish.

1.6 QUALITY ASSURANCE

A. Mockup:
   1. Provide sample installation for field testing window performance requirements and to determine acceptability of window installation methods.
   2. Approved mockup shall represent minimum quality required for the Work.
   3. Approved mockup shall [not] remain in place within the Work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site undamaged in manufacturer's or sales branch's original, unopened containers and packaging, with labels clearly identifying manufacturer and product name. Include installation instructions.

B. Storage:
   1. Store materials in accordance with manufacturer's instructions.
   2. Store materials off ground and under cover.
   3. Protect materials from weather, direct sunlight, and construction activities.

C. Handling: Protect materials and finish during handling and installation to prevent damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of design: Pella Corporation, Impervia windows.

B. Submit other manufacturers' equivalents under the provisions of Section 016000.

2.2 FIBERGLASS SINGLE-HUNG WINDOWS

A. Single-Hung Windows:
   1. Factory-assembled window with sash installed in frame.
   2. Frame and Sash Material: 5-layer, pultruded-fiberglass material, reinforced with interlocking mat.

B. Frame:
   1. Type: New construction frame.
   2. Overall Frame Depth: 3 inches.
   3. Nominal Wall Thickness of Fiberglass Members: 0.050 inch to 0.070 inch.
   4. Frame Corners:
      a. Mitered.
      b. Joined and bonded with thermoset polyurethane adhesive, nylon corner lock, and mechanically fastened.
   5. Sill: Fitted with weep valve assemblies.
   6. Jambs: Factory-drilled, counter-bored, installation screw holes.

C. Sash:
   1. Lower Sash: Lower sash vent, removable for cleaning exterior glass.
   2. Upper Sash: Fixed.
   3. Sash Corners:
      a. Mitered.
      b. Bonded and sealed with injected thermoset polyurethane adhesive.

D. Glazing:
   1. Float Glass: ASTM C 1036, Quality 1.
      a. Tempered Glass: ASTM C 1048.
   2. Type: 11/16-inch thick, insulating glass.
      a. Multi-layer Low-E coated with argon.
      b. Provide tempered glass at locations as required.
   3. Glazing units to meet Energy Star v3 requirements.

a. U-Value = .32
b. SHGC = .40

E. Weather Stripping:
1. Vent Sash: Dual weather-stripped around perimeter with fin-type, dual-pile, weather stripping.

2.3 OPTIONS

A. Grilles:
1. Insulating Glass: Contain 3/4-inch, contoured, aluminum grilles between the glass.
2. Finish: Factory-finished. Match window frame.

B. Insect Screens:
1. Compliance: ASTM D 3656 and SMA 1201.
2. Screen Cloth: Half-size with black, vinyl-coated, 18/16 mesh, fiberglass screen cloth set in aluminum frame fitted to outside of window.
3. Complete with necessary hardware.
4. Screen Frame Finish: Baked enamel.
a. Color: Match window exterior.

2.4 HARDWARE

A. Balances: Galvanized steel block-and-tackle balances.

B. Lock:
1. Type: Self-aligning, cam-action lock.
2. Windows 37 Inches Wide or Greater: 2 locks.
3. Standard Finish: Match window interior.

2.5 TOLERANCES

A. Windows shall accommodate the following opening tolerances:
1. Vertical Dimensions Between High and Low Points: Plus 1/4-inch, minus 0 inch.
2. Width Dimensions: Plus 1/4-inch, minus 0 inch.
3. Building Columns or Masonry Openings: Plus or minus 1/4-inch from plumb.

2.6 FINISH

A. Exterior and Interior Finish: Factory-applied powder-coat paint, comply with AAMA 613.
1. Color: To be selected from manufacturer’s standard colors.

2.7 INSTALLATION ACCESSORIES

A. Flashing/Sealant Tape:
   1. Aluminum-foil-backed butyl window and door flashing tape.
   2. Maximum Total Thickness: 0.013 inch.
   3. UV resistant.
   4. Verify sealant compatibility with sealant manufacturer.

B. Interior Insulating-Foam Sealant: Low-expansion, low-pressure polyurethane insulating window and door foam sealant.

C. Exterior Perimeter Sealant: manufacturer's standard sealant or equivalent high quality, multi-purpose sealant as specified in the joints sealant section.

2.8 SOURCE QUALITY CONTROL

A. Factory Testing: Factory test individual standard operable windows for air infiltration in accordance with ASTM E 283, to ensure compliance with this specification.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive windows. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Install windows in accordance with manufacturer's instructions.

B. Install windows to be weather-tight and freely operating.

C. Maintain alignment with adjacent work.

D. Secure assembly to framed openings, plumb and square, without distortion.

E. Integrate window system installation with exterior water-resistant barrier using flashing/sealant tape. Apply and integrate flashing/sealant tape with water-resistant barrier using watershed principles in accordance with window manufacturer's instructions.

F. Place interior seal around window perimeter to maintain continuity of building thermal and air barrier using insulating-foam sealant.

G. Seal window to exterior wall cladding with sealant and related backing materials at perimeter of assembly.

H. Leave windows closed and locked.

3.3 FIELD QUALITY CONTROL

A. Field Testing: Field-test windows in accordance with AAMA 502, Test Method A.

3.4 CLEANING

A. Clean window frames and glass in accordance with Division 1 requirements.

B. Do not use harsh cleaning materials or methods that would damage finish or glass.

C. Remove labels and visible markings.

3.5 PROTECTION

A. Protect installed windows to ensure that, except for normal weathering, windows will be without damage or deterioration at time of substantial completion.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Hardware for wood and hollow steel doors.

B. Maintenance.

1.2 REFERENCES

A. United States Standard (US) is used as a reference standard for finish designations

B. Door and Hardware Institute (DHI) “Recommended Locations for Builders’ Hardware for Standard Steel Doors and Frames” is used as a reference standard for hardware locations.
   1. This standard is referred to as “DHI Recommended Locations”.
   2. Maintain copy of this standard at job site during progress of work.

1.3 RELATED SECTIONS

A. Section 081313 – Hollow Metal Doors.

B. Section 081400 – Wood Doors.

1.4 REGULATORY REQUIREMENTS

A. For fire-rated door assemblies, provide hardware listed in Underwriters’ Laboratories “Building Materials Directory”, edition current at time of installation.

B. Comply with National Fire Protection Association (NFPA) “Standard for Fire Doors and Windows, NFPA 80” for products and installation.

C. Exterior and interior passage doors with latching hardware must be equipped with operating hardware devices that complies with NCHC 4.3.9(a)(1-4) (e.g. lever handle, push/pull latch, etc.).

D. Textured surface is required on door handles leading to hazardous areas (i.e. boiler rooms, electrical equipment rooms, etc.). [NCHC 4.3.9(e)(l)].

1.5 SUBMITTALS

A. Submit hardware schedule in manner indicated below. Coordinate hardware with doors, frames, and related work to ensure proper size, thickness, hand, function and finish of hardware.

B. Final hardware schedule: Based on finish hardware, organize a schedule into "hardware sets" containing all items required for each door opening. Include the following information:
   1. Type, style, function, size, finish and manufacturer of each hardware item.
   2. Explanation of abbreviations, symbols, codes, etc. contained in schedule.
   3. Fastening and other pertinent information.
   4. Location of hardware set cross-reference to drawings.
   5. Mounting locations for hardware.
   6. Door frame size and material.
   7. Keying information.

C. Submit schedule at earliest possible date since acceptance of hardware schedule must precede fabrication of other work (i.e., hollow metal frames) critical to construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by finish hardware, and other information essential to a coordinated review of hardware schedule.

D. Submit separate keying schedule indicating implementation of the Owner's final keying instructions.

E. Furnish templates to fabricators of doors, frames, and other work to be factory prepared for the installation of hardware. Upon request, check shop drawings of each other's work, to confirm that adequate provisions are made for proper location and installation of hardware.

F. No hardware shall be ordered until hardware schedule has been approved by the Architect.

G. Submit under provisions of Section 013300.

1.6 QUALITY ASSURANCE

A. Obtain each type of Hardware (i.e., locks) from a single manufacturer.

B. "Supplier" refers to a recognized architectural hardware supplier, with warehouse facilities, furnishing hardware of not less than 2 years, and who is, or who employs an experienced architectural hardware consultant who, at reasonable times during the course of the work, is available for consultation with the Owner, Architect and Contractor

about the project's requirements.

C. Suppliers Qualifications: Employ an Architectural Hardware Consultant (AHC) for consultation to Architect about project's hardware requirements, during the course of the Work.

D. Comply with American National Standards Institute (ANSI) Builders Hardware Manufacturer's Association (BHMA) A 156 series for performance standards of the products referenced.

1.7 PRE-INSTALLATION CONFERENCE

A. Pre-installation conference is required, prior to commencing work of this Section, to determine Owner requirements for keying.

B. Schedule under provisions of Section 013100.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Package hardware items individually. Label and identify package with door opening code to match schedule.

B. Deliver keys to Owner by security shipment direct from hardware supplier. Label and package keys individually for each door opening and provide in key cabinet.

1.9 MAINTENANCE

A. Provide manufacturer's maintenance services on door closers for one year from Date of Substantial Completion.

B. Provide special wrenches and tools applicable to each different or special hardware component.

1.10 PROJECT CONDITIONS

A. Whenever cutting and fitting is required to install hardware onto or onto surfaces that are later to be painted or finished, coordinate removal, storage, and reinstallation with finishing work.

B. Do not install surface mounted items until finishes on the substrate have been completed.

1.11 EXTRA MATERIALS

A. Furnish 10 key blanks.

B. Furnish a complete set of specialized tools as needed for Owner's continued adjustment, maintenance, and removal and replacement of builders hardware.

PART 2 - PRODUCTS

2.1 GENERAL

A. Coordinate finish hardware work with work of other trades as required.

B. Cooperate with Finish Hardware supplier in scheduling dates for submittals and delivery of templates and finish hardware.

2.2 ACCEPTABLE MANUFACTURERS

A. For each product, one of the listed manufacturers.

B. Butts and Hinges:
1. Hager Hinge Company.
2. Stanley Hardware.

C. Lock and Latchsets and Deadlocks:
1. Schlage.

D. Exit Devices:
1. Von Duprin.
2. Monarch.
3 Yale.

E. Cylinders:
1. Schlage.

F. Removable Mullions:
1. Von Duprin.
2. Monarch.

G. Overhead Closers:

1.	Sargent.	1431
2.	LCN Closers.	1461
3.	Yale Security, Inc.	3300
4.	Dor-o-matic.	SC80

H. Magnetic Holders:

1. Rixson-Firemark.

I. Stops and Bumpers:
1. Rockwood Manufacturing Company.
2. Hager.
3. Glynn-Johnson.
4. Builders Brass Works Corp.
5. H.B. Ives.

J. Plates:
1. Rockwood Manufacturing Company.
2. Hager.
3. Glynn-Johnson.
4. Builders Brass Works Corp.

K. Thresholds, Door Stripping and Seals:
1. Pemko.
2. National Guard Product, Inc.
3. Reese Enterprises, Inc.
4. Zero International, Inc.

L. No substitutions, except under provisions of Section 016000.

2.3 BUTTS AND HINGES

A. Butts: Unless otherwise indicated, BB1279, manufactured by Hager Hinge Company or equivalent by other acceptable manufacturer.
1. Provide non-removable pins for exterior doors and out-swinging corridor doors.
2. Provide hospital tips where indicated (HT).

B. Provide 4-1/2” x 4-1/2” butts for doors not over 36” wide.
1. Provide 5” x 4-1/2” butts for doors over 36” wide.

C. Provide one and one-half pair butts for each leaf.

D. Finish: US26D.

2.4 LOCK AND LATCHSETS

A. Comply with ANSI A156.2, Grade 2.

B. Cylindrical Locks (Interior Doors or as indicated): F Series, manufactured by Schlage or

equivalent by other acceptable manufacturer.

C. Dummy Trim: Match lock and latchsets.
   1. Unless otherwise indicated, provide trim both sides of door.

D. Design: St. Annes (STA).
   1. Provide knurling for locations indicated.

E. Finish: US26D.

2.5 EXIT DEVICES

A. Exit Devices: 99 Series devices, manufactured by Von Duprin or equivalent by other acceptable manufacturer.
   1. Trim: 17.
   2. Function: As scheduled.

B. Finish: US26D.

2.6 CYLINDERS AND KEYING

A. Provide manufacturer's special 6-pin tumbler cylinder, with construction masterkey feature, which permits voiding of construction keys without cylinder removal.

B. Grand masterkey the locks to existing system, with a new masterkey for the project, as directed by the Owner.

C. Furnish 3 change keys for each lock and 4 master keys for each master and grand master system.

2.7 REMOVABLE MULLIONS

A. Removable Mullions: KR4954 as scheduled by Von Duprin.

B. Finish: SP28.

2.8 OVERHEAD CLOSERS

A. Overhead Closers: The following manufactured by LCN or equivalent by other acceptable manufacturer.
   1. 1461 Series – Interior (As listed in hardware sets)
   2. Size in accordance with manufacturer's recommendations.

B. Provide bracket mount for out-swinging exterior doors and where scheduled (PA) for

interior doors.

C. Finish: 689.

D. Provide the following:
   1. Separate adjustments for latch speed, general speed, and hydraulic backcheck.
   2. Hydraulic fluid requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
   3. Spring power adjustable to increase power by fifty percent.

2.9 MAGNETIC HOLDERS

A. Magnetic Holders: FM 998, manufactured by Rixson-Firemark.

B. Closer/Holders: Smoke Chek 0600/601 as specified

C. Finish: 689.

2.10 STOPS AND BUMPERS

A. Stops: No. 236, manufactured by Hager Company or equivalent by other acceptable manufacturer.
   1. Substitute No. 243 where wall mounted stop cannot be used.
   2. Finish: US32D

2.11 PLATES

A. Kick Plates: As manufactured by Rockwood Manufacturing Company or equivalent by other acceptable manufacturer.
   1. Finish: To be selected.
   2. Height: 8”.

B. Length:
   1. Single Doors: Nominal width of door less 1”, except less 2” when plate is on push side.
   2. Double Doors: Nominal width of door leaf less 1”.

2.12 DOOR STRIPPING AND SEALS

A. Seals: As scheduled, manufactured by National Guard, Inc. or equivalent by other acceptable manufacturer.
   1. Finish: To be selected by Architect.

2.13 THRESHOLDS

A. Thresholds and Saddles: As scheduled, manufactured by National Guard, Inc. or equivalent by other acceptable manufacturer.
   1. Finish: Alum.

2.14 FASTENERS

A. Provide fasteners to suit conditions.
   1. Provide concealed fasteners for units that are exposed when the door is closed.
   2. Provide Phillips screws, except as otherwise indicated.

B. Provide exposed fasteners of finish to match the finish of the hardware item.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Verify that doors and frames are of size and materials indicated on schedule.
   1. Verify door swings.
   2. Verify fire rating requirements.

B. Ensure that electric power of the proper characteristics is available to electric operated devices.

C. Verify that doors and frames are ready to receive work and dimensions are as indicated.

3.2 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions.

B. Use templates provided by hardware item manufacturer.

C. Drill and countersink fasteners for units that are not factory-prepared for anchorage fasteners.

3.3 ADJUST AND CLEAN

A. Adjust and check each operating item of hardware to ensure proper operation or function.
   1. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

3.4 MAINTENANCE

A. After approximately six months occupancy, and within 10 days of notification by Architect, inspect the finish hardware installation, accompanied by the Supplier.
   1. Readjust each hardware item to restore proper function.
   2. Replace hardware items that have deteriorated or failed.
   3. Instruct Owner's personnel in recommended additions to the maintenance procedures.

3.5 FINISH SCHEDULE

A. Product numbers and designations for the finish hardware schedule are based on the following manufacturers:
   1. Hinges: Hager
   2. Locksets, Passage Sets, Privacy Sets, Closers, Exit Devices, Cylinders: Schlage
   3. Exit Devices: Von Duprin
   4. Deadlocks: Schlage
   5. Closers: LCN
   6. Push/Pull Bars, Push Plates, Pull Plates, Stops, Kick Plates, Flush Bolts, Coordinators: Hager/Rockwood .
   7. Wall Magnets, Closer/Holders: Rixson.
   8. Thresholds, Weatherstripping: National Guard Products

END OF SECTION

SECTION 08 91 19

FIXED LOUVERS

PART 1 - GENERAL

1.1 SUMMARY

A. Extruded aluminum stationary louver s.

1.2. RELATED SECTIONS

A. Section 074600 – Siding.

B. Section 079200 – Joint Sealants.

1.3 DEFINITIONS

A. Louver Terminology: Refer to AMCA Publication 501-93, Application Manual for Air Louvers, for definitions of terms for metal louvers not otherwise defined in this section of reference standards.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

A. Structural Performance: Design, engineer, fabricate and install exterior metal wall louvers to withstand the effects of loads and stresses from wind and normal thermal movement, without evidencing permanent deformation of louver components including blades, frames, and supports; noise or metal fatigue by louver blade rattle or flutter; and permanent damage to fasteners and anchors:
   1. Wind Load: Uniform pressure (velocity pressure) of 20 lbs per square foot acting inwards or outwards.
   2. Normal thermal movement is defined as that resulting from the following maximum change (range) in ambient temperature. Base design calculations on actual surface temperatures of metals due to both solar heat gain and night time sky heat loss.
      a. Temperature Change (Range): 100 degrees F (55.5 degrees Celsius).

B. Air Performance, Water Penetration and Air Leakage Ratings: Provide louvers complying with performance requirements indicated as demonstrated by testing manufacturers stock units, 4' x 4' (1.22m x 1.22m) , in accordance with Air Movement and Control Association (AMCA) Standard 500.

C. Air Performance and Water Penetration Under Wind Driven Rain Conditions: The HEVAC Technical Specification, "Laboratory Testing and Rating of Weather Louvres When Subjected to Simulated Rain," 4th Edition. The Building Research and Information Association (BSRIA), Bracknell, England.

D. Airborne Sound Transmission Loss: Provide acoustical louvers complying with airborne sound transmission loss ratings indicated, as demonstrated by testing manufacturers stock units according to ASTM E90-90, "Recommended Practice for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions."

E. Thermal Transmission Loss: Provide thermal-insulated and low-leakage louvers complying with performance indicated, as demonstrated by testing manufacturers stock units according to Architectural Aluminum Manufacturer's Association (AAMA) Standard 1503.1-1988, "Voluntary Test Method for Thermal Transmittance and Condensation Resistance for Windows, Doors and Glazed Wall Sections."

1.5 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain louvers and vents from a single source where alike in one or more respects with regard to type, design, and factory applied color finish.

B. Qualify welding process and welding operators in accordance with D1.2 Structural Welding Code - Aluminum and Structural Welding Code - Sheet Steel.
   1. Certify that each welder employed in unit of Work of this section has satisfactorily passed AWS qualification test for welding processes involved and, if pertinent, has undergone recertification.
   2. Testing for recertification is Contractor's responsibility.

C. Manufacturer shall demonstrate a minimum of five (5) years of related industry experience.

D. SMACNA Standard: Comply with SMACNA Architectural Sheet Metal Manual recommendations for fabrication, construction details, and installation procedures.

1.6 SUBMITTALS

A. Product Data: Manufacturer's technical data and technical instructions.

B. Shop Drawings: Submit plans, elevations, sections, and details showing profiles, angles, spacing of louver blades; unit dimensions related to wall openings and construction; free areas for each size indicated; and profiles of frames at jambs, heads and sills.
   1. Where installed products are indicated to comply with certain structural design loadings, include structural computations, material properties, and other

information needed for structural analysis which has been prepared by, or under the supervision of, a qualified professional engineer.

C. Samples: Specified metal finishes applied to 6 inch square metal samples of same thickness and alloy indicated for final unit of Work.

1.7 PROJECT CONDITIONS

A. Field Measurements: Check actual louver openings by accurate field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of the Work.
   1. Where field measurements cannot be made without delaying the Work, guarantee opening dimensions and proceed with fabrication of louvers and vents without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to guaranteed dimensions.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of design: American Louver and Vent Company, Triangle Gable Vent Louver.

B. Submit other manufacturers' equivalents under the provisions of Section 016000.

2.2 MATERIALS

A. Galvanized Steel Sheet: ASTM A 526 or A 527, G90 zinc coating, mill phosphatized.

B. Aluminum Sheet: ASTM B 209, alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer to produce required finish.

C. Aluminum Extrusions: ASTM B 221, alloy 6063-T5 or T52.

D. Fasteners: Of same basic metal and alloy as fastened metal, unless otherwise indicated. Do not use metals which are corrosive or incompatible with materials joined.
   1. Use types, gauges, and lengths to suit unit installation conditions.
   2. Use hex-head screws for exposed fasteners, unless otherwise indicated.

E. Anchors and Inserts: Of type, size, and material required for type of loading and installation indicated. Use nonferrous metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or expansion bolt devices for drilled-in-place anchors.

F. Bituminous Paint: SSPC-Paint 12 (cold-applied asphalt mastic).

G. Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in galvanized steel, complying with SSPC-Paint-20.

2.3 FABRICATION

A. Fabricate louvers and vents to comply with requirements indicated for design, dimensions, materials, joinery, and performance.

B. Preassemble louvers in shop to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinate installation.

C. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.

D. Fabricate frames, including integral sills, to fit in openings of size indicated with allowances made for fabrication and installation tolerances of louvers, adjoining construction, and perimeter sealant joints.
1. Include supports, anchorages, and accessories required for complete assembly.

E. Provide vertical mullions of type and at spacings indicated but not further apart than recommended by manufacturer, or 144 inches on center, whichever is less. At horizontal joints between louver units provide horizontal mullions except where continuous vertical assemblies are indicated.

F. Provide sill extensions and loose sills made of same material as louvers, where indicated, or required for drainage to exterior and to prevent water penetrating to interior.

G. Louvers shall be assembled entirely by welding.
1. Stationary louver blades shall be joined to each jamb frame with two one (1) inch long x 0.125" throat fillet welds concealed from view from the exterior and produced with the Pulsed Gas Metal Arc Welding Process (GMAW/MIG).
2. Frames shall be joined at each corner with full-length x 0.125" throat fillet welds concealed from view and produced with the Pulsed Gas Metal Arc Welding Process (GMAW/MIG).

2.4 BIRD AND INSECT SCREEN

A. Provide louvers with bird or insect screen installed on the interior face of the louvers where indicated.

1. Secure screens to louver frames with stainless steel sheet metal screws located at each corner and spaced approximately 12 inches on-center around the screen perimeter
2. Frames: Fabricate screen frames from the same material as louvers and join each corner by welding or mechanical fastener.
    a. Finish: Same finish as louver frames to which louver screens are attached.
    b. Insect Screening: 18 x 16 mesh 0.011" (0.28mm) diameter aluminum wire.

2.5 FINISHES

A. Comply with NAAMM Metal Finishes Manual for guidelines regarding application procedures and designations of finishes.

B. Finish louvers after assembly.

C. Fluorocarbon 3 Coat Coating System (Kynar 550): Manufacturer's standard 2 coat thermocured system composed of specially formulated inhibitive primer, fluorocarbon color coat, and clear fluorocarbon topcoat, with color coat and clear coat containing not less than 70 percent PVFD resin by weight; complying with AAMA 605.2; dry film thickness not less than 1.5 mils.
    1. Color and Gloss: As selected by Architect from manufacturer's standard choices for color and gloss.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions and directions for installation of anchorages which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.2 INSTALLATION

A. Locate and place louver units plumb, level, and in proper alignment with adjacent work.

B. 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.

C. Form closely fitted joints with exposed connections accurately located and secured.

D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

E. Repair finished damaged by cutting, welding, soldering, and grinding operations require for fitting and jointing. Restore finishes so there is no evidence of corrective work. Return items which cannot be refinished in field to shop, make required alterations and refinish entire unit, or provide new units.

F. Protect galvanized and nonferrous metal surfaces from corrosion or galvanic action by application of a heavy coating of bituminous paint on surfaces which will be in contact with concrete, masonry, or dissimilar metals.

G. Install concealed gaskets, flashings, joint fillers, and insulation, as louver installation progresses where required to make louver joints weathertight. Comply with Division 7 Section - Sealants for sealants applied during installation of louver.

3.3 ADJUSTING AND PROTECTION

A. Protect louvers and vents from damage of any kind during construction period including use of temporary protective coverings where needed and approved by louver manufacturer. Remove protective covering at time of Substantial Completion.

B. Restore louvers and vents damaged during installation and construction period, so that no evidence remains of correction work. If results of restoration are unsuccessful, as judged by Architect, remove damaged units and replace with new units.
   1. Clean and touch-up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

C. Test operation of adjustable wall louvers and adjust as needed to produce fully functioning units which comply with requirements.

3.4 CLEANING

A. Periodically clean exposed surfaces of louvers and vents, which are not protected by temporary covering, to remove fingerprints and soil during construction period; do not let soil accumulate until final cleaning.

B. Before final inspection, clean exposed surfaces with water and with a mild soap or detergent not harmful to finishes. Rinse thoroughly and dry surfaces.

END OF SECTION

SECTION 09 29 00

GYPSUM BOARD

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Gypsum board including:
   1. Wallboard for wall and partition systems.
   2. Backing for other systems.
   3. Wallboard for ceiling systems.

B. Acoustical sealant.

C. Trim and moldings.

D. Accessories.

1.2 RELATED SECTIONS

A. Section 061000 – Rough Carpentry.

B. Section 072100 – Thermal Insulation.

C. Section 098400 – Acoustical Insulation and Barriers.

D. Section 099100 – Painting.

1.3 REFERENCES

A. Underwriters' Laboratories (UL) "Fire Resistance Directory", January 1996, is used as a reference for fire rated assembly design numbers.

B. Gypsum Association (GA) "Fire Resistance Design Manual – Thirteenth Edition, 1992, is used as a reference for fire rated assembly design numbers.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ASTM C754 "Standard Specifications for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Wallboard, Backing Board, or Water-Resistant Backing Board".

B. Comply with ASTM C840 “Standard Specification for Application and Finishing of Gypsum Board”.

C. Where gypsum board partitions are indicated to have fire resistance rating, provide materials and installation identical to UL design numbers scheduled on the drawings.

1.5 SUBMITTALS

A. Submit product data for the following:
   1. Interior Gypsum board products.
   2. Trim
   3. Moldings.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Interior Gypsum Board and Related Products:
   1. United States Gypsum Company.
   2. National Gypsum Company.
   3. Georgia-Pacific Corporation.

B. Acoustical Sealant:
   1. United States Gypsum Co.
   2. Miracle Adhesives Corporation.
   3. W. W. Henry Co.

C. Moldings:
   1. Fry Reglet.
   2. Technical Ceiling Systems, Inc.

2.2 GYPSUM BOARD

A. Gypsum Wallboard: Sheetrock SW, manufactured by U.S. Gypsum, or equivalent by other acceptable manufacturer.
   1. Provide Firecode C core wallboard for fire-resistant rated assemblies and where indicated as “Type X” on Drawings.
   2. Thickness: 5/8” or as indicated.

B. Water-Resistant Gypsum Backing Board: Sheetrock W/R, manufactured by U.S. Gypsum, or equivalent by other acceptable manufacturer.
   1. Thickness: 5/8” or as indicated.

2.3 ACCESSORIES

A. Acoustical Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board. USG Acoustical Sealant, manufactured by United States Gypsum Company, or equivalent by other acceptable manufacturer.

B. Moldings: As follows, manufactured by Fry Reglet, or equivalent by other acceptable manufacturer.
   1. Ceiling Perimeter Molding: FDM-625-75, with curved section to match wall radius.
   2. Finish: White.

C. Trim: As follows, manufactured by United States Gypsum Company, or equivalent by other acceptable manufacturer.
   1. Corner Bead: 103.
   2. Metal Trim: 200A.
   1. Control Joint: 093.

D. Gypsum Board Reveals: As indicated on Drawings, manufactured by Fry Reglet, or equivalent by other acceptable manufacturers:
   1. 'X' Molding, ½" or as indicated, Fry Reglet #XDM-50-50.
   2. 'J' Molding, ½" or as indicated, Fry Reglet #JDM-50.
   3. Reveal Channel Screed, ½" x ¾" or as indicated, Fry Reglet #DCS-50-75.

E. Interior Joint Materials: USG Perf-A-Tape and USG Ready-Mixed Joint Compound.

F. Fasteners: ASTM C1002 Type S12 hardened screws.

PART 3 - EXECUTION

3.1 INSTALLATION - ACOUSTICAL ACCESSORIES

A. Install acoustical sealant within partitions in accordance with manufacturer's instructions.

3.2 INSTALLATION - GYPSUM BOARD

A. Comply with ASTM C840 for application and finishing of gypsum board, except as follows:
   1. Provide 5/8" thick face panels.

B. Provide expansion and control joints in ceilings exceeding 2,500 square feet in area, and

in partition wall and wall furring runs exceeding 30 feet. Do not exceed a distance of 50 feet, in either direction , between ceiling control joints and install a control joint where ceiling framing or furring changes direction. Do not exceed a distance of 30 feet between control joints in walls or wall furring, and install a control joint where an expansion joint occurs in the base exterior wall. Verify exact locations of control joints with Architect.

C. Where sound attenuation is used, set first layer of gypsum board, each side of partition , in continuous bed of acoustical sealant a floor and at vertical intersections.

D. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials. Install molding at intersection of partitions, furring, and columns with ceiling.

E. Treat cut edges and holes in moisture resistant gypsum board with sealant.

F. Tape and finish joints in accordance with Article 10, ASTM C840.
   1. Comply with specified project conditions.
   2. Omit third coat and sanding on concealed gypsum board where finishing is required for fire-resistance rating.

   3. Omit third coat and sanding where gypsum board is indicated as a base for adhesive-applied acoustical tile.

3.3 TOLERANCES

A. Maximum Variation from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 30 00

TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

C. Ceramic accessories.

D. Ceramic trim.

1.02 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.

1.03 REFERENCE STANDARDS

A. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile - Version; 2013.1.

B. ANSI A108.1A - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2013.1.

C. ANSI A108.1B - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 2013.1.

D. ANSI A108.1C - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex-Portland Cement Mortar; 2013.1.

E. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive; 2013.1.

F. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 2013.1.

G. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy; 2013.1.

H. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 2013.1.

I. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 2013.1.

J. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 2013.1.

K. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2013.1.

L. ANSI A108.12 - American National Standard Specifications for Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar; 2013.1.

M. ANSI A108.13 - American National Standard Specifications for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2013.1.

N. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2013.1.

O. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2013.1.

P. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2013.1.

Q. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2013.1.

R. ANSI A118.13 - American National Standard Specifications for Bonded Sound Reduction Membranes for Thin-Set Ceramic Tile Installation; 2013.1.

S. ANSI A118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar; 2013.1.

T. ASTM E492 - Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine; 2009.

U. ASTM E2179 - Standard Test Method for Laboratory Measurement of the Effectiveness of Floor Coverings in Reducing Impact Sound Transmission Through Concrete Floors; 2003 (Reapproved 2009).

V. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation - Version; 2013.1.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Reinstallation Meeting: Convene a reinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.

D. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Tile: 10 square feet (1 square meters) of each size, color, and surface finish combination.

1.06 QUALITY ASSURANCE

A. Maintain one copy of and ANSI A108/A118/A136.1 and TCNA (HB) on site.

B. Installer Qualifications: Company specializing in performing tile installation, with minimum of 5 years of documented experience.

1.07 MOCK-UP

A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.

B. Construct tile mock-up, incorporating all components specified for the location.
   1. Minimum size of mock-up to be single restroom in Treatment Center, patient room restroom area in Residential Tower.
   2. Approved mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.09 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature of 50 degrees F (10 degrees C) during installation of mortar materials.

PART 2 PRODUCTS

2.01 TILE

A. Manufacturers: All products by the same manufacturer.
   1. Crossville Inc. www.crossvilleinc.com.
   2. Substitutions: See Section 01 60 00 - Product Requirements.

B. Tile, Type Porcelain Tile:
   1. Moisture Absorption: less than.1% percent, maximum.
   2. Size and Shape: As indicated in drawings (6"x6").
   3. All tile to be rectified.
   4. Thickness: 3/8 inch (9.5 mm).
   5. Surface Finish: Non-slip.
   6. Color(s): To be selected by Architect from manufacturer's standard range.
   7. Products:
      a. Vista Americana.
      b. Cotto Americana.

2.02 TRIM AND ACCESSORIES

A. Trim: Matching bullnose and cove base ceramic shapes in sizes coordinated with field tile.
   1. Applications:
      a. Open Edges: Bullnose.
      b. Inside Corners: Jointed.
      c. Floor to Wall Joints: Cove base.
   2. Manufacturers: Same as for tile.

B. Thresholds: As specified in drawings

   a. Manufacturer: Schluter

2.03 SETTING MATERIALS

A. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4 or ANSI A118.15.

2.04 GROUTS

A. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
   1. Applications: Where indicated.
   2. Color(s): As selected by Architect from manufacturer's full line.
   3. Products:
      a. LATICRETE International, Inc; LATICRETE SPECTRALOCK PRO Premium Grout: www.laticrete.com.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 MAINTENANCE MATERIALS

A. Tile Sealant: Gunnable, silicone, siliconized acrylic, or urethane sealant; moisture and mildew resistant type.
   1. Applications: Between tile and plumbing fixtures.
   2. Color(s): As selected by Architect from manufacturer's full line.

2.06 ACCESSORY MATERIALS

A. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; not intended as waterproofing.
   1. Thickness: 20 mils (0.5 mm), maximum.
   2. Crack Resistance: No failure at 1/16 inch (1.6 mm) gap, minimum.

B. Waterproofing Membrane at Floors: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
   1. Type: Bonded Sheet Membrane.
   2. Material: Chlorinated polyethylene sheet membrane with polyester fabric laminated to both sides, 30 mils (0.8 mm), thick, minimum.

C. Underlayment at Floors: Specifically designed for bonding to thin-set setting mortar; not primarily a waterproofing material and having the following characteristics:
   1. Sound Reduction: Comply with ANSI A118.13, bonded membrane, ASTM E492, and ASTM E2179.
   2. Crack Isolation: Comply with ANSI A118.12.
   3. Water Resistance: Comply with ANSI A118.10, bonded waterproofing.
   4. Uncoupling Function: Allow for separation between membrane and the mortar adhering tile to the membrane when subjected to excessive substrate movement.

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 tile.

B. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.

C. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.

D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

3.03 INSTALLATION – GENERAL

A. Install tile and thresholds and grout in accordance with applicable requirements of ANSI A108.1A thru A108.13, manufacturer's instructions, and TCNA (HB) recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square and external angles bullnosed.

F. Sound tile after setting. Replace hollow sounding units.

G. Keep control and expansion joints free of mortar, grout, and adhesive.

H. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

I. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.

J. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.
   1. Use uncoupling membrane under all tile unless other underlayment is indicated.
   2. Where waterproofing membrane is indicated, install in accordance with TCNA (HB) Method F122, with latex-Portland cement grout.

B. Install tile-to-tile floor movement joints in accordance with TCNA (HB) Method EJ171F.

3.05 INSTALLATION - FLOORS - MORTAR BED METHODS

A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F111, with cleavage membrane, unless otherwise indicated.
   1. Where waterproofing membrane is indicated, with standard grout or no mention of grout type, install in accordance with TCNA (HB) Method F121.

B. Cleavage Membrane: Lap edges and ends.

C. Mortar Bed Thickness: 5/8 inch (15 mm), unless otherwise indicated.

3.06 INSTALLATION - WALL TILE

A. Over gypsum wallboard on wood or metal studs install in accordance with TCNA (HB) Method W243, thin-set with dry-set or latex-Portland cement bond coat, unless otherwise indicated.

B. Over interior concrete and masonry install in accordance with TCNA (HB) Method W202, thin-set with dry-set or latex-Portland cement bond coat.

3.07 CLEANING

A. Clean tile and grout surfaces.

3.08 PROTECTION

A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION 09 30 00

SECTION 09 65 00

RESILIENT FLOORING AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient tile flooring.

B. Resilient base.

C. Resilient stair accessories.

D. Resilient chair rail moulding

D. Installation accessories.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors.

1.03 REFERENCE STANDARDS

A. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2010)e1.

B. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012)e1.

1.04 SUBMITTALS

A. See Section 01 30 00 - 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. Selection Samples: Submit manufacturers complete set of color samples for Architect's initial selection.

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 60 00 - Product Requirements, for additional provisions.
2. Extra Flooring Material: 50 square feet (465152 square meters) of each type and color.

3. Extra Stair Materials: Quantity equivalent to 5 percent of each type and color.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.

B. Store all materials off of the floor in an acclimatized, weather-tight space.

C. Maintain temperature in storage area between 55 degrees F (13 degrees C) and 90 degrees F (72 degrees C).

1.06 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 (21 degrees C) to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F (13 degrees C).

PART 2 PRODUCTS

2.01 TILE FLOORING

A. Vinyl Composition Tile: Homogeneous, with color extending throughout thickness.
   1. Minimum Requirements: Comply with ASTM F1066, of Class corresponding to type specified.
   2. Size: 12 by 12 inch (305 by 305 mm).
   3. Thickness: 0.125 inch (3.2 mm).
   4. Manufacturers:
      a. Armstrong World Industries, Inc; www.armstrong.com.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 STAIR COVERING

A. Stair Treads: Rubber; full width and depth of stair tread in one piece; tapered thickness; nosing not less than 1-5/8 inch (41 mm) deep.
   1. Nominal Thickness: 0.1875 inch (4.75 mm).
   2. Nosing: Square.
   3. Style: Contrasting color abrasive grit strips full width.
   4. Color: Solid.
   5. Manufacturers:
      a. Johnsonite, a Tarkett Company: www.johnsonite.com.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

B. Stair Risers: Full height and width of tread in one piece, matching treads in material and color.
   1. Thickness: 0.080 inch (2.0 mm).

2. Manufacturers:
    a. Johnsonite, a Tarkett Company: www.johnsonite.com.
    b. Substitutions: See Section 01 60 00 - Product Requirements.

C. Stair Nosings: 1-1/2 inch (38 mm) horizontal return, 1-1/8 inch (28.5 mm) vertical return, full width of stair tread in one piece.
1. Material: Rubber.
2. Nominal Thickness: 0.125 inch (3.2 mm).
3. Pattern: Smooth.
4. Color: Solid color.
5. Manufacturers:
    a. Johnsonite, a Tarkett Company: www.johnsonite.com.
    b. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 RESILIENT BASE

A. Resilient Base: Millwork Wall Base, ASTM F1861, Type TS rubber, vulcanized thermoset; top set
1. Height: 6 inch (100 mm).
2. Thickness: 0.125 inch (3.2 mm) thick.
3. Style: Monach, Cove.
4. Color: Color as selected from manufacturer's standards.
5. Accessories: Premolded external corners, internal corners, and end stops.
6. Manufacturers:
    a. Johnsonite, a Tarkett Company: www.johnsonite.com.
    b. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 ACCESSORIES

A. Primers, Adhesives, and Seaming Materials: Waterproof; types recommended by flooring manufacturer.

B. Moldings, Transition and Edge Strips: Same material as flooring.

C. Filler for Coved Base: Plastic.

2.05 RESILIENT CHAIR RAIL MOULDING

A. Resilient Chair Rail Moulding,
1. Height: 4 inch
2. Color: Color as selected from manufacturer's standards.
3. Style: Bastition
4. Manufacturers:
    a. Johnsonite, a Tarkett Company: www.johnsonite.com.
    b. Substitutions: See Section 01 60 00 - Product Requirements.

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. 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.

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.

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 (45 mm) between joints.

B. Install base on solid backing. Bond tightly to wall and floor surfaces.

3.06 STAIR COVERINGS

A. Install stair coverings in one piece for full width and depth of tread.

B. Adhere over entire surface. Fit accurately and securely.

3.07 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's instructions.

3.08 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION 09 65 00

SECTION 09 65 19

RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Vinyl Composition Tile Flooring.

B. Vinyl Plank Flooring.

1.2 RELATED SECTIONS

A. Section 012300 – Alternates.

B. Section 033000 – Cast-In-Place Concrete.

1.3 SUBMITTALS

A. Submit product data for the following:
1. Vinyl flooring.
3. Edge strips.

B. Submit samples of the following for color selection:
1. Vinyl composition tile.
3. Edge strips.

C. Submit manufacturer's installation instructions.

1.4 MAINTENANCE DATA

A. Submit instructions for periodic cleaning and removal of specific stains.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials in area of application. Allow three days for material to reach equal temperature as area.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Maintain minimum 60 degrees F air temperature at installation area for three days prior to, during, and for 24 hours after installation.

1.7 EXTRA MATERIALS

A. Furnish extra materials to Owner under provisions of Section 017700.

B. Furnish min. 50 square feet of vinyl flooring in each color used.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Vinyl Composition Tile:
   1. Armstrong World Industries: Standard Excelon and Stontex Textures.

B. Vinyl Plank Flooring:
   1. Mohawk Industries: Select Step.
   2. Submit other manufacturers' equivalents under provisions of Section 16000.

2.2 VINYL COMPOSITION TILE

A. Comply with ASTM F-1066, Composition 1, Class 2.

B. Size: 12" x 12".

C. Thickness: 1/8".

D. Colors as indicated on Drawings.

2.3 VINYL PLANK

A. Minimum performance standards:
   1. 2,500 PSI.
   2. 20 Mil / 0.5 mm wear layer.
   3. Heat and pressure cured.
   4. Gauge 118" (3mm)

C. Size: as scheduled
   1. 7.25"x48"
   2. 18" x 36"

C. Colors as indicated on Drawings.

2.4 ACCESSORIES

A. Filler:
1. Premix latex type.
2. Recommended by resilient flooring manufacturer t suit application.

B. Edge Strips:
1. Edge Strips: CB-XX-C, manufactured by Johnson Rubber Co., or equivalent by other acceptable manufacturers. Unless noted otherwise in drawings.

C. Adhesive:
1. Waterproof type.
2. Recommended by resilient flooring manufacturer t suit application.

D. Cleaners and Polish: Recommended by resilient flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Ensure floor surfaces are smooth and flat with maximum variation of 1/8” in 10 feet.

B. Ensure concrete slab has trowel finish and has been properly cured.

C. Measure moisture content of substrate and do not install carpet when moisture content exceeds recommendations of adhesive manufacturer.

3.2 PREPARATION

A. Remove substrate cracks and bumps. Fill Low spots, cracks, and other defects with filler

B. Clean substrate of substances detrimental to proper performance of adhesive and resilient flooring.

C. Vacuum clean substrate prior to application.

D. Prime concrete slab if recommended by flooring manufacturer.

E. On masonry surfaces, fill voids along top edge of resilient base with filler.

3.3 INSTALLATION OF TILE

A. Adhere tile using full spread of adhesive.

B. Lay flooring with joints parallel to building lines to produce symmetrical tile pattern.

C. Lay tile in checkerboard fashion with grain reversed in adjacent tiles.

D. Install with minimum 1/2 full width tile at room or area perimeter, in square grid pattern with joints aligned.

E. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

F. Set flooring inn place, press with heavy roller to ensure full adhesion.

G. Terminate resilient flooring at centerline of door where adjacent floor finish is dissimilar.

H. Install edge strips at unprotected edges where flooring terminates.

3.4 CLEANING

A. Remove excess adhesive from floor, base and wall surfaces without damage.

B. Clean and polish floor surfaces in accordance with manufacturer’s instructions.

3.5 PROTECTION

A. Prohibit traffic from resilient flooring for 48 hours after installation.

END OF SECTION

SECTION 09 72 00

WALL COVERINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation and prime painting.

B. Wall covering.

1.02 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 09 91 23 - Interior Painting: Preparation and priming of substrate surfaces.

1.03 PRICE AND PAYMENT PROCEDURES

A. Wall covering work will be accomplished under one or more allowances.

B. See Section 01 21 00 - Allowances, for additional requirements.

C. Allowance includes purchase and delivery only.

1.04 REFERENCE STANDARDS

A. ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes; 2002 (Reapproved 2013).

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

C. ASTM F793 - Standard Classification of Wallcovering by Use Characteristics; 2010a.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on wall covering and adhesive.

C. Shop Drawings: Indicate wall elevations with seaming layout.

D. Test Reports: Indicate verification of flame and smoke ratings, when tested by UL.

E. Manufacturer's Installation Instructions: Indicate special procedures.

F. Maintenance Data: Submit data on cleaning, touch-up, and repair of covered surfaces.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 60 00 - Product Requirements, for additional provisions.

2. Extra Wall Covering Materials: 25 linear feet (8 linear m) of each color and pattern of wall covering; store where directed.

1.06 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. Installer Qualifications: Company specializing in performing the type of work specified in this section and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Inspect roll materials at arrival on site, to verify acceptability.

B. Protect packaged adhesive from temperature cycling and cold temperatures.

C. Do not store roll goods on end.

1.08 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the adhesive or wall covering product manufacturer.

B. Maintain these conditions 24 hours before, during, and after installation of adhesive and wall covering.

PART 2 PRODUCTS

2.01 BASE BID MANUFACTURER

A. MDC; Product Lentex, ASAP.

2.02 MATERIALS

A. Requirements for All Wall Coverings:
   1. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84.
   2. Chemical and Stain Resistance: No visible staining or discoloration and no damage to surface texture when tested in accordance with ASTM D1308.

B. Wall Covering - Type (WC): Vinyl coated fabric roll stock, conforming to the following:
   1. Roll Width: 54" inches (464515.2 mm).
   2. Color: as indicated in drawings.
   3. Pattern: as indicated in drawings.
   4. Overcoating: Stain resistant, polyvinyl fluoride over-coating, 0.0005 inch (0.01 mm) thick.

C. Substrate Primer and Sealer: Alkyd enamel type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are prime painted and ready to receive work, and conform to requirements of the wall covering manufacturer.

B. Measure moisture content of surfaces using an electronic moisture meter. Do not apply wall coverings if moisture content of substrate exceeds level recommended by wall covering manufacturer.

C. Verify flatness tolerance of surfaces does not vary more than 1/8 inch in 10 feet (3 mm in 3 m) nor vary at a rate greater than 1/16 inch/ft (1.5 mm/300 mm).

3.02 PREPARATION

A. Wash impervious surfaces with tetra-sodium phosphate, rinse and neutralize; wipe dry.

B. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

C. Surfaces: Correct defects and clean surfaces that affect work of this section. Remove existing coatings that exhibit loose surface defects.

D. Marks: Seal with shellac those that may bleed through surface finishes.

E. Apply one coat of primer sealer to substrate surfaces. Allow to dry. Lightly sand smooth.

F. Vacuum clean surfaces free of loose particles.

3.03 INSTALLATION

A. Apply adhesive and wall covering in accordance with manufacturer's instructions.

3.04 CLEANING

A. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants.

B. Reinstall wall plates and accessories removed prior to work of this section.

3.05 PROTECTION

A. Do not permit construction activities at or near finished wall covering areas.

END OF SECTION 09 72 00

SECTION 09 72 60

TACKABLE WALLCOVERING

PART 1 – GENERAL

1.01 SUMMARY

1.02 EDIT ITEMS NOT INCLUDED IN THIS PROJECT.

A. Section Includes:
   1. Resilient cork/linoleum tackable wallcovering.
   2. Accessories.

1.03 SUBMITTALS

A. Comply with Division 01 33 00.

B. Product data indicating compliance with specified requirements.

C. Installation Instructions.

1.04 QUALITY ASSURANCE

A. Surface Burning Characteristics Classification: Provide materials that meet classification ratings below:
   1. ASTM E84 (Flame Spread and Smoke Developed) II/B

B. Single Source Responsibility: Obtain tackable wallcovering system components from a single source.

1.05 PROJECT CONDITIONS

A. Maintain ambient temperature within the building at not less than 68 degrees Fahrenheit (20 degrees Celsius) for a minimum of seventy-two hours prior to beginning of installation.
   1. Do not install tackable wallcovering until the space is enclosed and weatherproof.

   2. Do not install tackable wallcovering until temperature is stabilized and permanent lighting is in place.

1.06 MAINTENANCE

A. Maintenance Instructions: Include precautions against cleaning materials and methods that may be detrimental to finishes and performance.

1.07 WARRANTY

A. Submit manufacturer's limited five-year written warranty against manufacturing defects.

PART 2 – PRODUCTS

2.01 PRODUCTS

A. Walltalkers® tac•wall: Uni-color resilient homogeneous tackable linoleum
   1. surface consisting of linseed oil, granulated cork, rosin binders, and dry pigments calendered onto natural burlap backing. Color shall extend through thickness of material.

2.02 ACCESSORIES

A. Adhesive: Solvent-free, SBR type linoleum adhesive (L-910) or polyvinyl acetate dispersion type (contact adhesive) when used in a press.

B. Color matched caulk:
   1. C100-62: Acrylic caulk pewter.
   2. C100-66: Acrylic caulk suntan.

C. Trim
   1. Aluminum J-cap trim for tac•wall

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions in which tackable wallcoverings will be installed.

B. Complete finishing operations, including painting, before beginning installation of tackable wallcovering materials.

C. Wall surfaces to receive wallcovering materials shall be dry and free from dirt, grease, loose paint, and scale.

D. Notify the contractor and architect in writing of any conditions detrimental to the proper and timely completion of the installation.

E. Beginning of installation means acceptance of surface conditions.

3.02 PREPARATION

A. Surface Preparation: Remove hardware, accessories, plates, and similar items to allow tackable wallcovering to be installed.

B. Plaster surface: Remove surface chalk. In new work, use moisture meter

C. Gypsum board surface: Recess nails and screws. Repair irregular tape joints, sand and remove dust.

D. Painted surface: Remove loose paint or scale. Sand surface of enamel or gloss paint and wipe clean with damp cloth.

E. Ensure wall surfaces scheduled to receive tackable wallcovering are properly sealed with a quality primer specified for use under flexible vinyl wallcoverings.

3.03 APPLICATION

A. Comply with manufacturer's printed installation instructions.

1. Cut sheets to size including a few inches of overage. Allow sheets to lay flat for at least twenty-four hours prior to the application. Mark roll direction and sequence on the backside of each sheet. Hang sheets in sequence as cut from the roll, do not reverse sheets.
2. Remove adhesive residue immediately after each panel is hung with a mild soap/water solution and a soft cloth/sponge.
3. Permanent HVAC system should be set to 68 degrees Fahrenheit (20 degrees Celsius) for at least seventy-two hours prior to, during, and after the installation.
4. Back roll each sheet prior to the installation to release curl memory.
5. For seamed applications, using a seam and strip cutter remove the factory edge of one sheet. Using the same tool, overlap and trace cut the mating edge of the second sheet. Repeat this step for as many sheets as required for the job.
6. Scribe, cut, and fit material to butt tightly to adjacent surfaces, built-in casework, and permanent fixtures and pipes.
7. Apply adhesive with a 1/16 inch square notch trowel to the area to receiving the sheet (apply enough for one sheet at a time).
8. Work from top to bottom then side to side. Roll sheet firmly into adhesive for positive contact and to remove air bubbles.
9. JOINTS MAY BE BUTTED, V-GROOVED, SPACED WITH REVEAL, OR JOINED WITH DECORATIVE T-MOLDING.

3.04 CLEANING

A. Clean wallcovering using a sponge with a neutral pH cleaning solution. Do not use abrasive cleaners. Rinse thoroughly with water and let dry before using.

B. It is important to remove adhesive while wet.

3.05 PROTECTION

A. Protect installed product and finish surfaces from damage during construction.

END OF SECTION 09 72 60

SECTION 09 77 33

GLASS FIBER REINFORCED PLASTIC PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glass fiber reinforced plastic panels.

B. Trim.

1.02 REFERENCE STANDARDS

A. 9 CFR 416.2 - Regulatory Requirements Under the Federal Meat Inspection Act and the Poultry Products Inspection Act, Part 416-Sanitation; current edition.

B. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2010.

C. ASTM D2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of Barcol Impressor; 2013a.

D. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.

E. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels; 2012.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

1.03 SUBMITTALS

A. See Section 01 30 00 - 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. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store panels flat, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Glass Fiber Reinforced Plastic Panels:
   1. Construction Specialties, Inc.: www.c-sgroup.com
   2. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PANEL SYSTEMS

A. Acroyn Wall Panels (WP):
   1. Panel Size: 4 by 10 feet (1.2 by 3.0 m).
   2. Panel Thickness: .040 inch
   3. Color: As selected by Architect.
   4. Attachment Method: Adhesive only, with trim and sealant in joints.

2.03 MATERIALS

A. Panels: Glass fiber reinforced plastic (FRP), complying with ASTM D5319.
   1. Surface Burning Characteristics: Maximum Flame Spread Index of 25, and maximum Smoke Developed Index of 450; when system tested in accordance with ASTM E84.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   3. Scratch Resistance: Barcol hardness score greater than 35, when tested in accordance with ASTM D2583.
   4. Impact Strength: Greater than 6 ft lb force per inch (320 J per m), when tested in accordance with ASTM D256.
   5. Sanitation and Cleanability: Comply with 9 CFR 416.2.

B. Trim: Vinyl; color coordinating with panel.

C. Fasteners: Nylon rivets.

D. Adhesive: Type recommended by panel manufacturer.

E. 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, drill bits, or snips.

C. Pre-drill fastener holes in panels, 1/8 inch (3.2 mm) greater in diameter than fastener, spaced as indicated by panel manufacturer.

D. Apply adhesive to the back side of the panel using trowel as 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. Drive fasteners to provide snug fit, and do not over-tighten.

H. Place trim on panel before fastening edges, as required.

I. Fill channels in trim with sealant before attaching to panel.

J. Install trim with adhesive and screws or nails, as required.

K. Seal gaps at floor, ceiling, and between panels with applicable sealant to prevent moisture intrusion.

L. Remove excess sealant after paneling is installed and prior to curing.

END OF SECTION 09 77 33

SECTION 09 84 00

ACOUSTICAL INSULATION AND BARRIERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Acoustical insulation and related accessories.

1.2 RELATED SECTIONS

A. Section 061000 – Rough Carpentry.

B. Section 092900 – Gypsum Board.

1.3 SUBMITTALS

A. Submit copies of manufacturer's detailed specifications and installation recommendations.

1.4 QUALITY ASSURANCE

A. Acoustical insulation shall meet Federal Specification HH-I-521E.

B. Sound Attenuation Blankets shall be noncombustible when tested in accordance with ASTM C665.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Acceptable manufacturers include:
   1. United States Gypsum Corporation.
   2. CertainTeed.
   3. Owens-Corning.

2.2 SOUND ATTENUATION BATTS

A. Type: Unfaced glass fiber acoustical insulation complying with ASTM C 665, Type I.

B. Surface Burning Characteristics, when tested in accordance with ASTM E 84:
   1. Maximum flame spread: 10
   2. Maximum smoke developed: 10

C. Combustion Characteristics:
   1. Passes ASTM E 136.

D. Fire Resistance Ratings:
   1. Passes ASTM E 119 as part of a complete fire tested wall assembly.

E. Dimensional Stability:
   1. Linear Shrinkage less than 0.1%

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install sound attenuation blanket in all metal stud walls as indicated on the drawings.

B. Blanket shall fill the wall space.

END OF SECTION

SECTION 09 91 00

PAINTING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Surface preparation and field application of paints and coatings.

B. Exterior and Interior Painting.

1.2 RELATED SECTIONS

A. Section 062000 – Finish Carpentry.

B. Section 064000 – Architectural Woodwork.

C. Section 081113 – Hollow Metal Doors and Frames.

D. Section 081416 – Flush Wood Doors.

E. Section 092900 – Gypsum Board.

1.3 SYSTEM DESCRIPTION

A. Finish Materials: Conform to applicable code for flame/smoke rating requirements.

1.4 SUBMITTALS

A. Product Data: Provide data on all finishing products.

B. Samples: Submit two samples, illustrating range of colors available for each surface finishing product scheduled.

1.5 FIELD SAMPLES

A. On actual wall surfaces and other exterior and interior building components, provide at least 100 sq. ft. of each finish.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Store and apply materials in environmental conditions required by manufacturer's instructions.

1.7 PROJECT CONDITIONS

A. Do not apply paint until concrete and mortar has cured 60 days minimum.

B. Do not apply exterior paint in snow, rain, fog, or mist. Apply paint only when relative humidity does not exceed 85 percent.

C. Do not apply to damp or wet surfaces.

D. Before starting interior paint application, broom clean area and remove excessive dust.

1.8 EXTRA STOCK

A. Furnish extra stock to Owner under provisions of Section 017700.

B. Provide one gallon unopened container of each product in each color used.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturers for Paint Materials:
1. The Sherwin Williams Company
2. Pittsburgh Paints, PPG Industries, Inc.
3. Pratt & Lambert, Inc.
4. Devoe and Raynolds Co.
5. Glidden Coatings & Resins Div., SCM Corporation.
6. Benjamin Moore

B. Coatings: Ready mixed except field catalyzed coatings of good flow and brushing properties, capable of drying or curing free of streaks or sags.

C. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials required to achieve the finishes specified.

D. Spackling Putty: Durabond Spackling Putty, manufactured by United States Gypsum Company.

2.2 EXTERIOR PAINT SYSTEMS

A. Exterior Ferrous Metals:
   1. First Coat: PPG Multi-prime Inhibitive Primer 97-682.
   2. Second and Third Coats: PPG Speedhide Gloss Oil Interior/Exterior Enamels, 6-252 Series.

B. Exterior Aluminum:
   1. First Coat: PPG Zinc Chromate Primer, 6-204.

   2. Second and Third Coats: PPG Speedhide Gloss Oil Interior/Exterior Enamels, 6-252 Series.

C. Exterior Galvanized Metal:
   1. First Coat: PPG Galvanized Steel Primer, 6-209.
   2. Second and Third Coats: PPG Speedhide Gloss Oil Interior/Exterior Enamels, 6-252 Series.

D. Exterior Concrete and Concrete Block:
   1. First Coat: Loxon Exterior Acrylic Masonry primer.
   2. Second and Third Coats: PPG Pitt-Flex Elastomeric Waterproofing coating, 4-110.

2.3 INTERIOR PAINT SYSTEMS

A. Interior Ferrous Metals:
   1. First Coat: PPG Multiprime Inhibitive Primer 97-682.
   2. Second and Third Coats: PPG Speedhide Interior Vinyl Acrylic Latex Semi-Gloss Enamel, #6-510.

B. Ferrous Beams, Joist and Deck:
   1. First Coat: (if not primed) PPG Speedhide Rust Inhibitive Steel Primer, #6-212.
   2. Second and Third Coats: PPG Speedhide Interior Solvent Base Dry Fog #6-160, Flat; 6-114, Semi-Gloss; 6-116, Gloss.

C. Galvanized Beams, Joist and Deck:
   1. First Coat: PPG Interior Flat Dry Fog Galvanized Steel Primer/Finish #G9514.

   2. Second and Third Coats: PPG Speedhide Interior Solvent Base Dry Fog #6-160, Flat; 6-114, Semi-Gloss; 6-116, Gloss.

D. Galvanized Metal:
   1. First Coat: PPG Speedhide 6-209 Galvanized Steel Primer.
   2. Second and Third Coats: PPG Speedhide Gloss-Oil Interior/Exterior Enamels, #6-

252 Series.

E. Aluminum:
1. First Coat: PPG Speedhide Ainc Chromate Primer #6-204.
2. Second and Third Coats: PPG Speedhide Gloss-Oil Interior/Exterior Enamels, #6-252 Series.

F. Concrete and Masonry:
1. First Coat: PPG Pitt Glaze High Performance Acrylic Latex Block Filler, 16-90 Series.
2. Second and Third Coats: PPG Speedhide Alkyd Enamel, #6-208 Series: Eggshell.

G. Interior Stained Woodwork:
1. First Coat: PPG Interior Semi-Transparent Stain Rez, 77-302.
2. Second and Third Coats: PPG Rez Polyurethane Clear Varnishes, 77-Series.

H. Interior Painted Woodwork:
1. First Coat: PPG Speedhide Quick-Drying Enamel Undercoater, 6-6.
2. Second Coat: PPG Speedcraft Interior Eggshell Latex Enamel, 5-411 Series.

I. Gypsum Board:
1. First Coat: PPG Speedcraft Interior Latex Primer-Sealer, White 5-2 Series.
2. Second and Third Coats: PPG Speedcraft Interior Latex Semi-Gloss, 5-510 Series.

J. Gypsum Board Ceilings:
1. First Coat: PPG Speedcraft Interior Latex Primer-Sealer, White 5-2 Series.
2. Second and Third Coats: PPG Speedcraft Interior Latex Semi-Gloss, 5-510 Series.

K. Equipment and Other Metal Surfaces:
1. First Coat: PPG Speedhide Rust Inhibitive Steel Primer, #6-208 Series.
2. Second and Third Coats: PPG Speedhide Gloss-Oil Interior/Exterior High Performance, High Gloss, DTM Industrial Waterborne Acrylic Enamel, 90 Series.

L. PVC Pipe and Insulated Pipe Covering:

1. First Coat: PPG Pitt-Tech One Pack Interior/Exterior High Performance, High Gloss, DTM Industrial Waterborne Acrylic Enamel, 90 Series.

M. Gypsum Board / Masonry Walls in Kitchen and Food Prep areas (USDA approved):
1. First Coat: PPG Pitt-Glaze Block Filler.
2. Second and Third Coats: PPG Pitt-Glaze Acrylic-Epoxy, Semi-Gloss.

2.4 COLORS

A. Colors as selected.

B. A maximum of 2 colors will be used in each room or space. Separation of colors to occur at corners or edges of walls or floating stripes.

C. Architect to furnish Color Schedule indicating colors and locations.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Verify that substrate conditions are ready to receive work.

B. Measure moisture content of porous surfaces using an electronic moisture meter. Do not apply finishes unless moisture content is less than 12 percent.

C. Correct minor defects and clean surfaces which affect work of this Section.

D. Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

E. Gypsum Board Surfaces: Fill minor defects with latex compounds. Spot prime defects after repair.

F. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

G. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove foreign matter. Remove oil and grease with a solution of tri-sodium phosphate, rinse well and allow to dry.

H. Uncoated Ferrous Surfaces: Remove scale by wire brushing, sandblasting, clean by washing with solvent. Apply treatment of phosphoric acid solution. Prime paint after repairs.

I. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust, hand clean, clean surfaces with solvent. Prime bare steel surfaces.

J. Interior Wood Items Scheduled to Receive Paint 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.

K. Interior Wood Items Scheduled to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats.

L. Exterior Wood Scheduled to Receive Paint Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior caulking compound after prime coat has been applied.

M. Exterior Wood Scheduled to Receive Transparent Finish: Remove dust, grit, and foreign matter; seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes with tinted exterior caulking compound after sealer has been applied.

3.2 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Sand transparent finishes lightly between coats to achieve required finish.

C. Where clear finishes are required, tint fillers to match wood.

D. Back prime interior and exterior wood work scheduled to receive paint finish with primer paint.

E. Back prime interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.

3.3 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

A. Refer to Divisions 15 and 16 for schedule of color coding, identification banding of equipment, duct work piping, and conduit.

B. Paint shop primed equipment.

C. Remove unfinished louvers, grilles, covers, and access panels and paint separately. Paint dampers exposed behind louvers, grilles, convector and baseboard cabinets to match face panels.

D. Prime and paint insulated and exposed pipes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are prefinished.

E. Paint exposed conduit and electrical equipment occurring in finished areas except prefinished surfaces.

F. Paint both sides and edges of plywood backboards.

G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.4 CLEANING

A. As work proceeds, promptly remove finishes where spilled, splashed, or spattered.

END OF SECTION

SECTION 10 26 01

WALL AND CORNER GUARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Corner guards.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry Blocking for wall and corner guard anchors.

B. Section 09 72 00 - Wall Coverings: Terminating wall covering at corner guard.

C. Section 01 23 00 – Alternates

1.03 REFERENCE STANDARDS

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

B. ICC A117.1 - Accessible and Usable Buildings and Facilities; International Code Council; 2009 (ANSI).

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

D. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2014.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate physical dimensions, features, anchorage details, and rough-in measurements.

C. Samples: Submit one sections of corner guard, 24 inch (600 mm) long, illustrating component design, configuration, color and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wall and Corner Guards:

1. Construction Specialties, Inc; www.c-sgroup.com.
2. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 COMPONENTS

A. Corner Guards - Surface Mounted: High impact vinyl with extruded aluminum full height retainer.
   1. Size: 3/4" inches
   2. Corner: Square.
   3. Color: As selected from manufacturer's standard colors.
   4. Length: One piece, floor to ceiling.
   5. Preformed end caps.

2.03 FABRICATION

A. Fabricate components with tight joints, corners and seams.

B. Pre-drill holes for attachment.

C. Form end trim closure by capping and finishing smooth.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.

3.02 INSTALLATION

A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to wall framing members only.

B. Extend corner guard from floor to ceiling

END OF SECTION 10 26 01

SECTION 10 28 00

TOILET, BATH AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Toilet Accessories.

B. Grab Bars.

1.2 RELATED SECTIONS

A. Section 061000 – Rough Carpentry.

1.3 SUBMITTALS

A. Submit product data for each accessory.

B. Submit schedule of accessories:
1. Provide schedule using same room numbers and names as those on Contract Drawings.
2. Indicate accessories to be used in each room or space by manufacturer and model number and quantity of each.

C. Submit manufacturer's installation instructions.

1.3 DESIGN REQUIREMENTS

A. Size and spacing of grab bars shall conform to the following:
1. The diameter or width of the gripping surfaces of a handrail or grab bar shall be 1-1/4 in to 1-1/2 in (32 mm to 38 mm), or the shape shall provide an equivalent gripping surface.
2. If handrails or grab bars are mounted adjacent to a wall, the space between the wall and the grab bar shall be 1-1/2 in (38 mm).
3. Handrails may be located in a recess if the recess is a maximum of 3 in (75 mm) deep and extends at least 18 in (455 mm) above the top of the rail.

B. The structural strength of grab bars, tub and shower seats, fasteners, and mounting devices shall meet the following specification:

1. Bending stress in a grab bar or seat induced by the maximum bending moment from the application of 250 lbf (1112N) shall be less than the allowable stress for the material of the grab bar or seat.
2. Shear stress induced in a grab bar or seat by the application of 250 lbf (1112N) shall be less than the allowable shear stress for the material of the grab bar or seat. If the connection between the grab bar or seat and its mounting bracket or other support is considered to be fully restrained, then direct and torsional shear stresses shall be totaled for the combined shear stress, which shall not exceed the allowable shear stress.
3. Shear force induced in a fastener or mounting device from the application of 250 lbf (1112N) shall be less than the allowable lateral load of either the fastener or mounting device or the supporting structure, whichever is the smaller allowable load.
4. Tensile force induced in a fastener by a direct tension force of 250 lbf (1112N) plus the maximum moment from the application of 250 lbf (1112N) shall be less than the allowable withdrawal load between the fastener and the supporting structure.
5. Grab bars shall not rotate within their fittings.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturers:
1. Bobrick Washroom Equipment.
2. Bradley Corporation.
3. American Specialties, Inc.

2.2 TOILET ACCESSORIES

A. Provide the following accessories, manufactured by Bobrick Washroom Equipment, or equivalent other acceptable manufacturer. Refer to architectural drawings for accessories and product number

B. Finish: All accessories to be satin finish stainless steel.

2.3 UNDERCOUNTER PIPE GUARDS:

A. Where undercounter pipes are exposed to view and as required by ADA guidelines, provide soft, resilient molded vinyl pipe guards equal to Trubro Lave Guard as manufactured by IPS Corporation of Collierville, TN in model numbers, sizes and lengths required for the pipes indicated. Guards shall be virtually indestructible with a nominal wall of 1/8" with internal ribs. Guards shall be self-extinguishing according to ASTM D635 tests and result in zero mold growth

according to ASTM G21 and G22 testing. Must be capable of being wiped clean using common detergents

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify rough openings for recessed units so that units are correctly sized and located.

B. Ensure correct location of built-in framing and anchorage.

3.2 INSTALLATION

A. Install accessory units using fasteners appropriate to substrate and recommended by manufacturer of unit.

B. Anchor grab bars adequately to withstand 250 pounds applied load.

C. Install units plumb and level and at heights indicated.

END OF SECTION

SECTION 10 44 00

FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire extinguishers.

B. Fire extinguisher cabinets.

C. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.

B. Section 09 91 23 - Interior Painting: Field paint finish.

1.03 REFERENCE STANDARDS

A. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.

B. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate cabinet physical dimensions.

C. Product Data: Provide extinguisher operational features.

1.05 FIELD CONDITIONS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Extinguisher Cabinets and Accessories:
   1. Ansul, a Tyco Business; _____: www.ansul.com.
   2. JL Industries, Inc; _____: www.jlindustries.com.
   3. Larsen's Manufacturing Co; _____: www.larsensmfg.com.
   4. Potter-Roemer; _____: www.potterroemer.com.
   5. Pyro-Chem, a Tyco Business; _____: www.pyrochem.com.
   6. Strike First Corporation of America; EL-Elite Architectural Series Fire Extinguisher Cabinet, Non-Fire Rated: www.strikefirstusa.com.
   7. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
   1. Provide extinguishers labeled by UL for the purpose specified and indicated.

B. Water Type Fire Extinguishers: Stainless steel tank, pressurized, with premixed antifreeze solution, including hose and nozzle.
   1. Class: 2A.
   2. Size: 2.5 gallon (9.4 L).
   3. Finish: Polished chrome.
   4. Temperature Range: Minus 40 degrees F (Minus 40 degrees C) to 120 degrees F (49 degrees C).

C. Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gage.
   1. Class: A:B:C.

2. Size: 5 pound (2.27 kg).

2.03 WHEELED FIRE EXTINGUISHERS

A. Wet Chemical Type Fire Extinguishers: Stainless steel tank, with pressure gage.
   1. Class: K.
   2. Size: 1.8 gallons (___ L).

2.04 FIRE EXTINGUISHER CABINETS

A. Metal: Formed stainless steel sheet; 0.036 inch (0.9 mm) thick base metal.

B. Cabinet Configuration: Semi-recessed type.
   1. Trim: Returned to wall surface, with 3 3/4 inch (____ mm) projection, 1 3/4 inch (____ mm) wide face.

C. Door: 0.036 inch (0.9 mm) thick, reinforced for flatness and rigidity; latch. Hinge doors for 180 degree opening with two butt hinge. Provide nylon catch.

D. Door Glazing: Plastic, clear, 1/8 inch (3 mm) thick acrylic. Set in resilient channel gasket glazing.

E. Cabinet Mounting Hardware: Appropriate to cabinet. Pre-drill for anchors.

F. Weld, fill, and grind components smooth.

G. Finish of Cabinet Exterior Trim and Door: No. 4.

H. Finish of Cabinet Interior: White enamel.

2.05 ACCESSORIES

A. Extinguisher Brackets: Formed steel, chrome-plated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install cabinets plumb and level in wall openings

C. Secure rigidly in place.

D. Place extinguishers in cabinets.

END OF SECTION

SECTION 10 55 50

POSTAL SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish all labor, materials and equipment to provide complete installation of mail collection and delivery boxes.

B. Install in quantities and locations as indicated on drawings

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.3 QUALITY ASSURANCE

A. Manufacturer: Provide products of manufacturers which are approved by U S Postal Service when mail system is serviced by USPS. In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for preparation of substrate, installation of anchors, and application of postal units.

B. Requirements of Regulatory Agencies: Comply with U S Postal Service requirements for construction and installation of units serviced by USPS carriers.

1.4 DELIVERY AND STORAGE

A. Delivery of material shall be coordinated with installation to minimize storage periods at the project site. Deliver in manufacturer's unopened container's bundles or packages, fully identified with manufacturer's name, brand, type and grade. Protect from weather, soiling and damage, using handling equipment and storage techniques recommended by the manufacturer

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's technical data and installation instructions for postal specialties units required.

1. Provide manufacturer's certification that equipment proposed conforms to U.S Postal Service regulations and has been approved by the Postmaster General.

B. Samples: Submit samples, of each color and finish of exposed materials and accessories required for postal specialties.

C. Shop Drawings: Submit shop drawings for fabrication and erection of postal specialties. Include plans, elevations and large scale details. Show anchorages and accessory items. Provide location template drawings for items supported or anchored to permanent construction.

PART 2 - PRODUCTS

2.1 PRODUCTS

A. Manufacturer: Subject to compliance with requirements, provide products by one of the following:

1. Salsbury Industries, Los Angeles, California

2. Bommer Industries, Landrum, SC

3. Cutler-Federal, Inc. Eaton Park, FL

4. Auth-Florence Manufacturing Co. Chicago, Illinois

B. Horizontal Front Loading Collection or Receiving Boxes:

1. Provide mailbox units in quantity shown on drawings, but not less than TWO separate, double-column units as described herein.

2. Mailboxes shall be equal to 4C Custom Horizontal Mailboxes as manufactured by Salsbury Industries.

a. Fabricate of plate and heavy sheet metal components.

b. Furnish complete with hinged door with post office lock and matching trim kit.

c. Provide 1" high engraved numbers in accordance with USPS requirements and as approved by local authority assigning mailing address.

d. Construct units of aluminum, allow 6063-T5 with satin anodized finish NAAMM- M31C21A31.

C. Locks: 5 pin cylinder locks with 2 keys each.

D. For EACH mailbox unit, door quantities and sizes shall be as follows:

1. 90 doors for tenant use with minimum 13"W x 3"H face dimensions.

2. 8 doors identified as "PARCEL" locker with minimum 13"W x 17"H face dimensions.

3. Double section with door with slot and identified as "OUTGOING MAIL'' with minimum 13"W x 6-1/2"H face dimensions.

E. Configuration shall be as approved by the Architect

F. Color As selected by Architect from manufacturer's standard (but not less than four) colors.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify all dimensional requirements and substrate requirements for mailboxes prior to installation.

B. Install all postal specialties in strict compliance with U S. Postal Service requirements and in accordance with manufacturer's instruction and recommendations.

END OF SECTION

SECTION 11 31 00

RESIDENTIAL APPLIANCES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Kitchen appliances.

B. Laundry appliances.

1.02 RELATED REQUIREMENTS

A. Section 22 10 05 - Plumbing Piping: Plumbing connections for appliances.

B. Section 26 27 17 - Equipment Wiring: Electrical connections for appliances.

1.03 REFERENCE STANDARDS

A. UL (EAUED) - Electrical Appliance and Utilization Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data indicating dimensions, capacity, and operating features of each piece of residential equipment specified.

C. Copies of Warranties: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. Electric Appliances: Listed and labeled by UL and complying with NEMA standards.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 KITCHEN APPLIANCES

A. Cooking Exhaust, Type ____: Range hood.
   1. Size: 30 inches (762 mm) wide.
   2. Fan: Two-speed, 180 cfm (85 L/s)
   3. Exhaust: Recirculating.
   4. Features: Include cooktop light, removable grease filter, retractable visor, and ____.
   5. Exterior Finish: Painted steel, color to be selected by owner and architect.
   6. Manufacturers:
      a. Frigidaire Home Products; ____: www.frigidaire.com.
      b. GE Appliances; ____: www.geappliances.com.
      c. Whirlpool Corp; ____: www.whirlpool.com.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify utility rough-ins are provided and correctly located.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Anchor built-in equipment in place.

3.03 ADJUSTING

A. Adjust equipment to provide efficient operation.

3.04 CLEANING

A. Remove packing materials from equipment and properly discard.

B. Wash and clean equipment.

END OF SECTION

SECTION 12 21 13

HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Horizontal Vinyl Blinds

1.2 SUBMITTALS

A. Manufacturer’s complete CSI 3- part specification sheet.

B. Product Sample: Submit working hand sample or mock up blind as required.

C. Color Sample: Submit two 6" samples of vinyl slat indicating color and dimensions.

1.3 DELIVERY, STORAGE AND HANDLING

A. Product to be delivered in manufacturer’s original packaging.

B. Products to be handled and stored to prevent damage to materials, finishes and operating mechanisms. Store in a clean, dry area, laid flat to prevent sagging and twisting of packaging.

1.4 PROJECT / SITE CONDITIONS

A. Roof must be tight, windows and frames installed and glazed, and interior doors hung.

B. Wet work including concrete, masonry, plaster, stucco, terrazzo, sheetrock, spackling, and taping (including sanding) shall be complete and dry.

C. Ceilings, window pockets, electrical, and mechanical work above the product shall be complete.

D. Electrical power (110 volt AC) shall be available for installer’s tools within 500 ft. of product installation areas.

1.5 WARRANTY

A. Lifetime warranty: manufacturer shall repair or replace for the life of the blind, at its option, without charge, any part found defective in workmanship or material as long as the blind remains in the same window for which it was purchased.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of design: Graber Simple Selections 1” horizontal vinyl blind.

B. Submit other manufacturers’ equivalents under the provisions of Section 01 60 00.

2.2 HORIZONTAL BLINDS

A. Product: Graber 1” Designer Vinyl Blinds.

B. Color: To be selected by Architect from manufacturer’s standard color options.

C. Headrail: Shall be 1" high by 1 1/2" wide, U-shaped, with 1/8” light blocking lip, on the bottom center line, made of phosphate treated steel, finished with a polyester baked enamel paint finish and shall measure .022" thick.

D. Bottomrail: Phosphate treated steel, finished with a polyester baked enamel paint finish.

E. Slats: Slats shall be rigid; UV stabilized crowned PVC, nominally 1”wide and .045”thick. Slat edges are straight cut.

F. Cord tilter shall be a snap-in component incorporating a worm and pulley of low friction thermoplastic and a gear of nylon. Tilt cords shall be secured to pulley and treated with tassels at tilt end.

G. Cord lock shall be metal of a snap-in design incorporating a floating shaft- type locking pin. Cord lock shall incorporate a crash proof safety-feature that will lock blind automatically upon release of cord. End of lift cords will be treated with plastic tassels.

H. Braided ladder shall be made of 100% high tenacity polyester incorporating two extra strength rungs per ladder to support slats.

2.3 FABRICATION

A. Prior to fabrication, verify actual opening dimensions by on-site measurement. Calculate blind dimensions to fit within specified tolerances.

B. Fabricate blinds to fill openings from head to sill and jamb-to-jamb. Locate blind divisions at mullions.

C. Fabricate blinds to fill all exterior window openings except at doors, door sidelights and transoms unless noted.

PART 3 – EXECUTION

3.1 INSPECTION

A. Window treatment subcontractor shall be responsible for inspection of site, field measurements, and approval of mounting surfaces and installation conditions.

B. Subcontractor shall verify that site is free of conditions that interfere with blind installation and operation, and shall begin installation only when any unsatisfactory conditions have been rectified.

3.2 INSTALLATION

A. Installation shall comply with manufacturer specifications, standards, and procedures.

B. Provide support brackets as per manufacturer's installation instructions.

C. See installation instructions packaged with blinds for more installation details.

D. Provide adequate clearance to permit unencumbered operation of blind and hardware.

E. Demonstrate blinds to be in uniform and smooth working order.

3.3 CLEANING

A. Clean soiled blinds with a mild soap solution only. Do not use cleaning methods involving heat, bleach, abrasives, or solvents. Do not use window cleaner or cloths with paper content.

B. Ensure proper drying following cleaning by providing adequate ventilation.

END OF SECTION

SECTION 14 24 00

HYDRAULIC ELEVATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes conventional holed hydraulic passenger elevators.

B. Related Sections include the following:

1. Division 2 Section "Earthwork" for excavation to accommodate plunger-cylinder assembly.

2. Division 3 Section "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.

3. Division 4 Section "Unit Masonry" for setting sleeves, inserts, and anchoring devices in masonry.

4. Division 5 Section "Structural Steel" for the following:

a. Attachment plates, angle brackets, and other preparation of structural steel for fastening guide-rail brackets.

b. Divider beams.

5. Division 5 Section "Metal Fabrications" for the following:

a. Attachment plates and angle brackets for supporting guide-rail brackets.

b. Divider beams.

c. Pit ladders.

6. Division 9 Section for finish flooring in elevator cars.

7. Division 13 Section "Fire Alarm" for smoke detectors in elevator lobbies to initiate emergency recall operation and heat detectors in shafts and machine rooms to disconnect power from elevator equipment before sprinkler activation and for connection to elevator controllers.

8. Division 16 Section "Premises Telephone Wiring" for telephone service to elevators.

9. Should job use “holed” elevators, General Contractor agrees to provide a crane at no charge for the hoisting of the elevator jacks into place. Roof cannot be put over the elevator shafts until after the jacks are in place.

1.3 DEFINITIONS

A. Defective Elevator Work: Operation or control system failures; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; the need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.

1.4 SUBMITTALS

A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information.

B. Shop Drawings: Show plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment and signals. Indicate variations from specified requirements, maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.

C. Samples: For exposed finishes of cars, hoistway doors and frames, and signal equipment; 3-inch- (75-mm-) square samples of sheet materials; and 4-inch (100-mm) lengths of running trim members.

D. 2Maintenance Manuals: Include three operation and maintenance instructions, parts listing with sources indicated, recommended parts inventory listing, emergency instructions, and similar information. Include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel. Submit for Owner's information at Project closeout as specified in Division 1.

E. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An elevator installer who has completed elevator installations locally, similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance for the last 10 years.

B. Regulatory Requirements: In addition to local governing regulations, comply with applicable provisions in ASME A17.1, "Safety Code for Elevators and Escalators."

1. Seismic Risk Zone: Project is located in Zone **2**

C. Accessibility Requirements: In addition to local governing regulations, comply with Section 4.10 in the U.S. Architectural & Transportation Barriers Compliance Board's

"Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)."] [Section 407 in ICC A117.1.]

1.6 COORDINATION

A. Coordinate installation of sleeves, block outs, and items that are embedded in concrete or masonry for elevator equipment. Furnish templates and installation instructions and deliver to Project site in time for installation.

B. Furnish well hole, and casing on a firm price basis.

C. Coordinate locations and dimensions of other work relating to hydraulic elevators including pit ladders, sumps, and floor drains in pits; and electrical service, electrical outlets, lights, and switches in pits and machine rooms.

1.7 WARRANTY

A. Special Manufacturer's Warranty: Written warranty, signed by manufacturer agreeing to repair, restore, or replace defective elevator work within specified warranty period.

1. Warranty Period: 12 months from date of Substantial Completion.

1.8 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance service by skilled employees of the elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Provide parts and supplies as used in the manufacture and installation of original equipment.

1. Perform maintenance, including emergency callback service, during normal working hours.

2. Include 24-hour-per-day, 7-day-per-week emergency callback service.

3. If this elevator requires special diagnostic or programming tools to perform maintenance and trouble shooting, these tools must be furnished to the owner at no additional cost.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide hydraulic elevators by one of the following:

1. United Elevator Services.

2. Montgomery KONE Inc.

3. ThyssenKrupp Elevator Systems.

4. Otis Elevator Company.

2.2 MATERIALS AND COMPONENTS

A. General: Provide manufacturer's standard elevator systems. Where components are not otherwise indicated, provide standard components as required for a complete system.

B. Pump Units: Positive-displacement type with a maximum of 10 percent variation between no load and full load and with minimum pulsation.

1. Submersible pump, with submersible squirrel-cage induction motor, suspended inside tank from vibration isolation mounts.

2. Solid-state starting.

C. Hydraulic Silencers: Provide hydraulic silencer containing pulsation-absorbing material in a blowout-proof housing at pump unit.

D. Piping: Provide size, type, and weight piping recommended by manufacturer, and provide flexible connectors to minimize sound and vibration transmissions from power unit.

1. Casing for Underground Piping: PVC pipe complying with ASTM D 1785 joined with PVC fittings complying with ASTM D 2466 and solvent cement complying with ASTM D 2564.

E. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work where installation of devices is specified in another Specification Section.

F. Protective Cylinder Casings: sealed PVC or HDPE cylinder protection system shall be installed.

2.3 OPERATION SYSTEMS

A. Passenger Elevators: Provide manufacturer's standard microprocessor operation system for each elevator or group of elevators as required to provide type of operation system indicated.

1. Single Elevator: Provide "selective collective automatic operation" as defined in ASME A17.1.

2. Multiple-Car Group: Provide "group automatic operation" as defined in ASME A17.1.

B. Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators where indicated.

1. Independent Service: Key switch in car control station removes car from group operation and allows it to respond only to car calls. Key cannot be removed from key switch when car is in independent service. When in independent service, doors close only in response to the door close button.

2.4 SIGNAL EQUIPMENT

A. General: Provide signal equipment for each elevator or group of elevators with hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements of acrylic or other permanent, non-yellowing translucent plastic.

B. Car Control Stations: To provide a seamless look to the front return, provide the manufacturer's integral satin stainless steel car control station without slanted recesses for buttons or projections for the car operating panel. Mount in swing return panel adjacent to car door.

1. Include call buttons for each landing served and other buttons, switches, and controls required for specified car operation.

2. Mark buttons and switches with manufacturer's standard metal identification for required use or function that complies with ASME A17.1.

3. Mount controls at heights complying with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)."] [ICC A117.1.

C. Emergency Communication System: Provide system that complies with ASME A17.1 and the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)." On activation, system dials preprogrammed number of monitoring station and identifies elevator location to monitoring station. System provides two-way voice communication without using a handset and provides visible signals that indicate when system has been activated and when monitoring station has responded. System is contained in telephone cabinet, with identification, instructions for use, and battery backup power supply.

D. Car Position Indicator: For passenger elevator cars, provide illuminated-signal type, digital-display type, or segmented type, located above car door or above car control station. Also provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.

E. In-Car-Lanterns: Provide direction lanterns and audible signal indicating car arrival and directions of travel located in the car doorjamb.

F. Hall Push-Button Stations: Provide hall push-button stations with 1/8” thick stainless steel faceplate at each landing for each elevator or group of elevators as indicated.

G. Corridor Call Station Pictograph Signs: Provide signs matching hall push-button stations with text and graphics according to ASME A17.1, Appendix H.

2.5 DOOR REOPENING DEVICES

A. Infrared Array: Provide door reopening devices with a uniform array of 40 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more of the light beams shall cause doors to stop and reopen.

1. Nudging Feature: After car doors are prevented from closing for a predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.

2.6 PASSENGER ELEVATOR CAR ENCLOSURES

A. General: Provide manufacturer's solid steel car enclosures (steel enclosures shall extend completely behind applied panels) with applied wall panels, suspended ceiling, trim, accessories, access doors, doors, power door operators, thresholds, lighting, and ventilation.

1. Floor finish is specified in another Section.

2. Plastic-Laminate Wall Panels: Plastic laminate adhesively applied to fire-retardant-treated particleboard with plastic-laminate panel backing and manufacturer's standard protective edge trim.

3. Fabricate car with recesses and cutouts for signal equipment.

4. Fabricate car doorframe integrally with satin stainless steel front wall of car.

5. Stainless-Steel Doors: Flush, hollow-metal construction, fabricated from stainless steel.

6. Sills: Extruded aluminum metal, with grooved surface, 1/4 inch (6.4 mm) thick

7. Standard suspended ceiling with LED lighting.

8. Handrails: 1 ½” diameter stainless steel handrail on rear wall. To prevent a catching hazard the ends of the handrails must return back towards the cab on all ends.

2.7 PASSENGER HOISTWAY ENTRANCES

A. General: Provide manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Provide frame size and profile to coordinate with hoistway wall construction.

1. Where gypsum board wall construction is indicated, provide self-supporting frames with reinforced head sections.

B. Materials and Fabrication: Provide manufacturer's standards but not less than the following:

1. Powder coated, hollow-metal construction

2. Sills: Extruded metal, with grooved surface, 1/4 inch (6.4 mm) thick. Provide aluminum finish.

3. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.

4. Where gypsum board wall construction is indicated, provide fire-resistance-rated, hollow-metal, door-and-frame hoistway entrances. Provide self-supporting frames with reinforced head sections.

C. Materials and Fabrication: Provide selections indicated; provide manufacturer's standards but not less than the following:

2.8 PASSENGER ELEVATORS

A. Elevator Nos.: 1-2

1. Rated Load: 3500 lbs

2. Rated Speed: 100 fpm

3. Rise: 20’8” field verify

4. Power Supply: Refer to electrical drawings

5. Landings served 3

6. Openings: 3 Front

7. Machine room location: adjacent at upper level

8. Operation System: duplex selective collective automatic operation

9. Provide conventional holed elevator system

10. Auxiliary Operations:

a. Independent service.

b. Hoistway access

11. Car Enclosures: As follows:

a. Inside dimensions 6’8” wide x 5’5” deep x 7’4” tall (under ceiling)

b. Front Walls: Satin stainless steel.

c. Car Fixtures: Satin stainless steel

d. Side and Rear Wall Panels: Raised laminate panels with laminates choices from manufacturers standard selector

e. Reveals: Powder coated.

f. Door Sills: Aluminum.

g. Ceiling: Standard suspended ceiling with LED lighting in powder coated frame.

h. Handrails: 1 ½” diameter cylindrical satin stainless steel, at rear wall.

i. Floor prepared to receive VCT others

12. Hoistway Entrances: As follows:

a. 3’6” wide x 7’ tall

b. Type: Single-speed side sliding

c. Frames and doors, Powder coated

d. Sills: Aluminum.

13. Hall Fixtures Satin stainless steel

14. Additional Requirements: As follows:

a. Provide protective blanket hooks in all cars and one complete set of full-height blankets per group.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Verify critical dimensions, and examine supporting structure and other conditions under which elevator work is to be installed. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Excavation for Jack: Drill excavation in each elevator pit to accommodate installation of cylinders; comply with applicable requirements in Division 2 Section "Earthwork."

1. Provide well casings as necessary to retain walls of well hole.

B. Install cylinders in protective casings of PVC. Delete subparagraph below if local authorities having jurisdiction require space left empty.

C. Install cylinders plumb and accurately centered for elevator car position and travel. Anchor securely in place, supported at pit floor.

D. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.

E. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts designed to effectively prevent transmission of vibrations to structure and thereby eliminate sources of structure-borne noise from elevator system.

F. Install underground piping in Schedule 40 PVC pipe casing, provided by general contractor, assembled with solvent-cement fittings.

G. Lubricate operating parts of systems as recommended by manufacturers.

H. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay installation of sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.

I. Leveling Tolerance: ½ inch, up or down, regardless of load and direction of travel.

J. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.

3.3 FIELD QUALITY CONTROL

A. Acceptance Testing: On completion of elevator installation and before permitting use (either temporary or permanent) of elevators, perform acceptance tests as required and recommended by ASME A17.1 and by governing regulations and agencies.

B. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times tests are to be performed on elevators.

3.4 DEMONSTRATION

A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of operational failure and other building emergencies. Train Owner's personnel in procedures to follow in identifying sources of operational failures or malfunctions. Confer with Owner on requirements for a complete elevator maintenance program.

B. Make a final check of each elevator operation with Owner's personnel present and before date of Substantial Completion. Determine that operation systems and devices are functioning properly.

3.5 PROTECTION

A. Temporary Use: Do not use elevators for construction purposes unless cars are provided with temporary enclosures by general contractor, either within finished cars or in place of finished cars, to protect finishes from damage.

1. General Contractor agrees to sign Elevator Contractor’s standard Temporary Use and Acceptance form at an agreed rate.

2. Provide full maintenance service by skilled, competent employees of elevator Installer for elevators used for construction purposes. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Use same parts and supplies as used in the manufacture and installation of original equipment.

3. Provide protective coverings, barriers, devices, signs, and other procedures to protect elevators. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so that no evidence remains of correction work. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

END OF SECTION

SECTION 21 05 00

FIRE PROTECTION AND SPRINKLER

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Refer to section 220500, General Provisions, which shall also govern sprinkler and fire protection work.

B. General Provisions of the Contract, General and Supplementary Conditions and General Requirements apply to this section.

1.02 DESCRIPTION OF WORK

A. A complete sprinkler system shall be furnished and installed to insure the lowest insurance rate possible; however, no requirements of NFPA 13, NFPA 24, Local Fire Marshal, State Fire Marshal, Division of Fire Prevention, Water Department, shall be violated and/or omitted.

B. **All areas indicated on plans shall be provided with an automatic sprinkler system in accordance with N.F.P.A. 13. This shall also include, attic areas. Sprinkler contractor shall utilize a dry sprinkler system in these areas.**

C. **It shall be the Contractors responsibility to examine all architectural drawings, sections, details and structural drawings to determine areas required to be sprinklered to meet applicable code requirements.**

D. All cutting of holes necessary for the installation of work specified under this section of the specifications shall be done by this Contractor. Applicable provisions elsewhere in the specifications apply here, also. Cutting will be done under the supervision of the General Contractor. Do all patching of concrete, masonry and other materials which are cut by this Contractor, employing the services of the Contractor whose work is cut. Patching shall be of the same material and shall be finished neatly.

1.03 DRAWINGS

A. The drawings show and the specifications describe the work intended under this section, but the Contractor shall be solely responsible for taking his own measurements and installing the work to fit the conditions encountered everything necessary for a complete and satisfactory installation shall be furnished and installed by this Contractor performing work under this contract, whether or not specifically shown or specified. This is not intended to cover major items of equipment not shown or specified but is intended and will be interpreted to cover all miscellaneous parts, devices, accessories, controls, and appurtenances which are required by any applicable code, ordinance, regulation or law required to complete and place the system in satisfactory operation and required for a first class job which is complete in every respect.

B. Sprinklers shall be referred to on drawings, submittals, and other documentation, by the sprinkler identification or model number as specifically published in the appropriate agency listing or approval. Trade names or other abbreviated designations shall not be allowed.

1.04 DEVIATIONS

A. No deviations from the plans and specifications shall be made without the full knowledge and consent of the Architect. Should this Contractor find at any time during the progress of the work that, in his judgement, existing conditions made desirable a modification in requirements covering any item he shall report such items to the Architect for his decision and instructions. No changes shall be made until written request has been made by the Contractor to the Architect and written approval of said change has been given by the Architect.

1.05 OMISSIONS

A. The drawings and specifications shall both be considered as part of the contract. Any work or material shown in one and omitted in the other shall be furnished and performed as though shown in both to give a complete sprinkler job approvable by the Authorities Having Jurisdiction. The awarding of the contract shall be construed to mean that this Contractor will install a complete and satisfactory system, furnishing all items of materials and labor to accomplish this result whether or not such items are particularly specified or shown on plans. Should any discrepancy or omission be discovered in the plans or specifications, such must be reported to the Architect immediately in order that any necessary addenda may be issued before the bids are received.

1.06 INTERPRETATION

A. The meaning and intent of the plans and specifications shall be subject to the interpretations of the Architect whose decision on all questions pertaining thereto shall be binding upon the Contractor.

1.07 LOCAL STANDARDS

A. Term, "Local Standards", as used herein, means the standards of design and construction of respective municipal (or county) department or utility company.

1.08 COOPERATION

A. This Contractor shall visit the job site and thoroughly inform himself as to the conditions under which the work is to be done.

B. Failure to route pipes through the building without interfering with other Contractor's equipment or construction and at maximum possible elevation shall not constitute a reason for an extra charge.

C. All equipment requiring service shall be made easily accessible.

1.09 PERMITS, LICENSES AND INSURANCE

A. The Contractor shall obtain and pay for all permits, licenses, fees, etc., required for his work.

1.10 SHOP DRAWINGS

A. Submit shop drawings to designer. Obtain stamped approved plans and letter of approval and then submit approved drawings to Authority Having Jurisdiction. No sprinkler work shall be done prior to all above approvals.

B. Submit 5 equipment submittals of all materials proposed for use in the work, giving name of manufacturer, trade name, catalog number and all information hereinafter requested. It is understood and agreed by all concerned that the Architect shall have the authority to reject any

or all material, equipment or workmanship not complying with these specifications and that Contractor shall replace such rejected equipment, materials or workmanship upon notification by the Architect. Material or equipment rejected by the Architect shall be removed from the premises within twenty-four (24) hours after notification; otherwise, the Architect may have same removed at the Contractor's expense.

C. Submittal data and drawings shall be examined by the General Contractor prior to his transmitting to the above-mentioned authorities. The submittals shall bear the Contractor's stamp of approval evidencing that he has examined and checked same and that he found the information contained to be in accordance with the Contract requirements.

D. All materials and equipment furnished under this Section (210500) shall be new and approved by Underwriters' Laboratories, Inc. (UL), Factory Mutual (FM), or American Water Works Association (AWWA) where applicable.

1.11 GUARANTEE

A. The Contractor shall furnish a guarantee covering all labor and materials for a period of one year from date of acceptance of his work which shall include an agreement to repair replace and make good at his expense, any and all defects which may appear in his work or materials during that time, which in the judgement of the Architect arise from defective workmanship or imperfect or inferior materials.

PART 2 PRODUCTS

2.01 PIPING

A. Pipe penetrating building floors, building walls, and pit walls shall be ductile iron, thickness Class 50, 350 psi pressure rating, in accordance with ANSI A21.51, tar coated outside, cement mortar lined inside in accordance with ANSI A21.4. Pipe shall be push-on mechanical joints on one end and flanged on the other.

B. Pipe and fittings, inside buildings for wet system: Schedule 40 branch lines and Schedule 10 black steel pipe mains conforming to ASTM A120 or A53, plain end, threaded end, or grooved end, as applicable to joint types involved; class 125 for pressure rating 175 psi black cast iron threaded fittings conforming to ANSI 816.4 or Schedule 40 black steel butt welding fittings conforming to ANSI 816.9 or Victaulic, or equal black malleable iron fitting, as applicable to joint types involved; fittings shall have at least 175 or 300 psi cold water working pressure ratings, and UL listing for fire protection service.

C. Pipe and fittings, inside building for dry system: Schedule 80 galvanized steel pipe and fittings.

D. Pipe Grooved Joints: ASME / AWWA C606. Fittings and couplings shall be of a single manufacturer, UL listed and FM approved. Fittings shall be ductile iron, short-pattern with flow equal to standard pattern, Victaulic FireLock™.

2.02 SLEEVES, FERRULES AND ESCUTCHEONS

A. The Contractor shall furnish and install pipe sleeves for all piping installed under this section. Sleeves shall be located at all wall partitions and floor penetrations.

B. All floor and exterior wall sleeves shall extend 1-1/2" above finished floor and beyond exterior wall surface. The void space between pipe and sleeve shall be caulked with an approved type waterproof caulking material.

C. Pipe sleeves through partitions and interior walls shall be exact thickness and terminate flush with wall or partition finish.

D. Pipe sleeves shall be steel of equal wall thickness of standard pipe the size in question.

E. Provide chromium-plated escutcheon plates for all exposed pipes projecting through floors or walls.

2.03 FLANGES AND VALVES

A. Flanges: 125 pound cast iron threaded, or 150 pound steel slip-on welding neck, or threaded, as applicable, conforming to ANSI 816.1 and 816.5 respectively; flanges for cast iron and ductile iron pipe shall be properly sized for this pipe, and shall have counterbored long hubs completely covering pipe threads; standard steel bolts and nuts; and plain rubber gaskets.

B. Valves, Interior: Check valves shall be equal to Crane No. 375 UL approved flanged pattern iron body swing check valves. Cutoff valves shall be equal to Crane No. 467 UL flanged pattern outside screw and yoke wedge gate valves. Cutoff valves up to 2" shall be bronze Crane No. 459 cut off valves; 2-1/2 and 3" shall be No. 467-1/2, 4" to 6" shall be equal to CLOW #F-5733.

C. Backflow preventer shall be double check type, flanged 150 psi working pressure with two OS&Y shut-off valves. The backflow preventer shall meet all requirements of the University of South California Foundation of Cross Connection Control and AWWA Standard C506. The backflow preventer shall also be tested and listed by UL and/or FM. A factory representative shall supervise and inspect the installation of the backflow preventer. After the installation has been approved by the factory representative, the factory representative shall send a formal letter of approval to the Architect.

2.04 DRAIN VALVES

A. Provide drain and test valves as required.

2.05 SIAMESE CONNECTIONS

A. Siamese Connection (Wall Type): Siamese connection to be W.D. Allen, or equal, Figure 276, 2-1/2" X 2-1/2" X 4", with independent clapper valves, caps, and chains all chrome plated brass. Provide ball drip equal to W.D. Allen Figure 2112 to drain siamese.

2.06 WATERFLOW ALARM VALVE

A. Variable pressure, vertical type, equipped with standard fittings, including gauges, electric switch with 2 contacts, single pole, double throw for connections to an annunciator furnished under Division 16, and a retard chamber to prevent false alarms for surges or fluctuation in water pressure.

B. Valve shall have Underwriter's Laboratories Label.

C. Autocall - Model 4164 - Type WF-5

Globe Automatic Sprinkler Co., Inc. - Model E Grinnell Corp - Model A, A2 Raisler Corp. - Model B or Bl

D. Alarm: Provide horn and strobe.

2.07 ELECTRIC SWITCHES

A. Provide all O.S.&Y. valves and indicator valves with tamper switches containing electrical contacts for supervision, and be connected to fire alarm system.

B. All electrical power wiring and interlock wiring will be provided and installed by the electrical contractor.

2.08 HANGER AND SUPPORTS

A. All piping shall be supported with UL approved hangers, types and sizes required, Grinnell or equal. Hangers shall be attached to structural steel work by clamping or other approved methods, except that structural steel works shall not be drilled or punched. Wherever necessary, furnish install and securely anchor to or between building members suitable angle iron or others steel members to support sprinkler work.

2.09 SPRINKLER HEADS, EXTRA SPRINKLER CABINET

A. Sprinkler heads shall be proper types, ratings and spacings for the areas involved. Provide 1 sprinkler cabinet with (12) extra sprinkler heads and sprinkler wrench for emergency use, at a point as directed by the Architect.

2.10 AIR COMPRESSOR

A. Air compressor for dry pipe system shall be base mounted,tank-type, single stage, splash lubricated, electric driven, enclosed belt guard, and automatic start and stop pressure switch sized as required by N.F.P.A. 13. Verify available voltage with electrical drawings.

2.11 ELEVATOR SPRINKLER SYSTEM

A. All sprinkler heads shall be installed in bottom of elevator shaft and in elevator equipment rooms.

B. Heads shall be sidewall type in shaft and brass upright or sidewall type as required for elevator equipment room.

C. Heads shall be 212^0 type.

D. A gate valve with tamper switch shall be installed on all lines serving elevator shafts and elevator machine rooms.

E. Installation shall be in accordance with State of Tennessee elevator inspector.

PART 3 EXECUTION

3.01 TESTING

A. All piping in the sprinkler system, both inside and outside of the building, shall be tested at a water pressure of 200 psi for a period of not less than two hours. All bracing shall be in place and all air shall be removed from the system through the hydrants, drain valves, etc., before the test pressure is applied.

3.02 CLEANING

A. During the progress of the work, keep the premises reasonably clean as regards trash, debris, etc., caused by his materials and workmen. After all work has been completed and prior to final inspection, all equipment shall be thoroughly cleaned and all trash and debris removed from the job site.

3.03 INSTALLATION

A. All sprinkler work including the installation of underground fire main shall be installed by a Licensed Registered Fire Protection Contractor. Underground fire mains and hydrants shall be

installed and in service prior to construction.

B. Install piping with ample flexibility to permit free expansion and contraction of pipework without putting excessive stress on piping, supports, or equipment, or causing damage or breakage. Do not bend any pipe. Ream pipe ends after cutting pipe. For threaded joints, use suitable non-hardening tape. Screw flanges to cast iron and ductile iron pipe; screw or weld flanges to steel pipe.

C. Pipe passing under building grade beams shall have a 6 inch minimum clearance to prevent possible damage from building settlement.

D. Pipe passing through pit walls, building walls, and building floors below grade shall be provided with sleeves of standard weight galvanized steel pipe. The annular spaces between pipe and sleeves shall be sealed with link seal hydro-static pipe wall seal. Sleeves shall be sized as follows:

3" pipe - 8" ID sleeve

4" pipe - 10" ID sleeve

6" pipe - 12" ID sleeve

E. Before connections are made to the automatic sprinkler risers, all parts of the system to be thoroughly flushed until water runs clear. Minimum flow during flushing shall be as follows:

PIPE SIZE	FLOW GPM
3	300
4	400
6	750

F. All grooved joint couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

3.04 AS-BUILT DRAWINGS

A. Contractor shall keep an accurate record of the location of all site fire water lines and site potable water lines installed by him and shall provide Owner upon completion of the work with a drawing showing all location dimensions and elevations.

3.05 SPRINKLER SYSTEM

A. Systems shall be wet system or dry system as required by N.F.P.A. 13 and climate as indicated on plans.

B. Head spacing to be ordinary hazard - light hazard as required by N.F.P.A. 13.

C. System shall be hydraulically calculated by a licensed sprinkler contractor.

D. Refer to architectural reflected ceiling plan for head location.

E. Locate heads in center of tile.

F. All areas shown on the Architectural drawings shall be provided with automatic sprinkler protection, including areas indicated in Part I, Description of Work.

G. Sprinkler heads subject to mechanical damage shall be provided with approved type wire

guards.

H. Sprinkler and fire lines shall be run in concealed ceiling space and semi-recessed chrome pendent sprinkler heads utilized in all areas that have finished ceilings.

I. Areas that do not have a finished ceiling, sprinkler, and fire lines shall be exposed; and brass upright sprinkler heads shall be used.

J. All sprinkler heads installed for light hazard occupancy shall be quick response type in accordance with N.F.P.A. 13.

K. All underground sprinkler work including fire hydrants shall be installed and completed prior to building construction.

END OF SECTION

SECTION 312300
EXCAVATION AND FILL

PART 1- GENERAL

1.01 SECTION INCLUDES

A. Excavation to line, grade, and configuration as shown on Construction Drawings for proposed structures and future expansion areas.

B. Fill to line, grade, and configuration as shown on Construction Drawings for proposed structures and future expansion areas.

C. Compacting for materials in acceptable manner as specified herein.

1.02 RELATED SECTIONS

A. Section 311123 – Aggregate Material

B. The "Foundation Subsurface Preparation" as shown on the Construction Drawings and/or the Architectural-structural drawings and/or the "Report of Subsurface Exploration", whichever is more stringent.

C. Construction drawings and Report of Subsurface Exploration.

1.03 REFERENCE STANDARDS

A. See Section 310000

1.04 QUALITY ASSURANCE

A. An independent testing laboratory, selected and paid for by Contractor, shall be retained to perform construction testing on filling operations and subgrade analysis as specified in Section 310000 and as specified herein.

1.05 SUBMITTALS

A. Shop drawings or details pertaining to excavating and filling for structures are not required unless otherwise shown on Construction Drawings or if contrary procedures to Contract Documents are proposed.

B. Submit 100-pound sample of each type of off-site fill material that is to be used in backfilling in air-tight container(s) to the independent testing laboratory or submit gradation and certification of aggregate material that is to be used at the site to the independent testing laboratory for review.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Fill material from on-site as specified in Section 310000 and approved by Geotechnical Engineer.

B. Fill material from off-site as specified in Section 310000 and approved by Geotechnical Engineer.

C. Aggregate material as specified in Section 321123.

2.02 EQUIPMENT

A. Transport off-site materials to the project using well-maintained and operating vehicles. Once on site, transporting vehicles shall stay on designated haul roads and shall at no time endanger improvements by rutting, overloading, or pumping.

PART 3 – EXECUTION

3.01 PREPARATION

A. Identify lines, elevations, and grades necessary to construct building subgrades as shown on Construction Drawings.

B. Protect benchmarks, property corners, and other survey monuments from damage or displacement. If marker needs to be removed it shall be referenced by licensed land surveyor and replaced, as necessary, by same.
C. Locate and identify utilities that have previously been installed and protect from damage.
D. Locate and identify existing utilities that are to remain and protect from damage.
E. Overexcavate and properly prepare areas of subgrade that are not capable of supporting proposed structures. Stabilize these areas by using acceptable geotextile fabrics or aggregate materials placed and compacted.

3.02 EXCAVATION

A. Excavate building areas to line and grade as shown on Construction Drawings being careful not to overexcavate beyond elevations needed for building subgrades.
B. Place suitable excavated material into project fill areas as specified in Section 312300.
C. Unsuitable excavated material is to be disposed of in a legal manner.
D. Perform excavation using capable, well-maintained equipment and methods acceptable to Owner and local governing agencies.

3.03 FILLING AND SUBGRADE PREPARATION

A. Building area subgrade pad shall be that portion of site directly beneath and 10-feet beyond building and appurtenances, including limits of future building expansion areas as shown on Construction Drawings.
B. Prepare building area subgrade pad in strict accordance with "Foundation Subsurface Preparation" as shown on the Construction Drawings and/or the architectural-structural drawings, whichever is more stringent. Rock larger than 6-in. shall not be part of building subgrade fill.
C. Areas exposed by excavation or stripping and on which building subgrade preparations are to be performed shall be scarified to a minimum depth of 8-inches and compacted as per the geotechnical report included herein.
Place fill materials used in preparation of subgrade as per the geotechnical report included herein.

3.04 COMPACTION

A. Maintain optimum moisture content as specified above of fill materials to attain required compaction density.
B. Test materials in accordance with Section 310000.
C. Corrective measures for non-compaction: Remove and recompact deficient areas until proper compaction is obtained at no additional expense to Owner.

3.05 MAINTENANCE OF SUBGRADE

A. Verify finished subgrades to ensure proper elevation and conditions for construction above subgrade.
B. Protect subgrade from excessive wheel loading during construction, including concrete trucks, dump trucks, and other construction equipment.
C. Remove areas of finished subgrade found to have insufficient compaction density to depth necessary and replace in manner that will comply with compaction requirements by use of materials equal to or better than best subgrade material on site. Surface of subgrade after compaction shall be hard, uniform, smooth, stable, and true to grade and cross-section.

3.06 FINISH GRADING

A. Finish grading shall be in accordance with Section 310000 and as more specifically specified herein.

B. Check grading of building subgrades by string line from grade stakes (blue tops) set at not more than 50-foot centers. Tolerances of 0.10-feet, more or less, will be permitted. Contractor to provide engineering and field staking necessary for verification of lines, grades, and elevations.

END OF SECTION

SECTION 22 05 00

GENERAL PROVISIONS - PLUMBING

PART 1 GENERAL

1.01 WORK INCLUDED

A. It shall be the contractor's responsibility to furnish and install complete all systems, equipment, and related items described under Division 22.

B. It shall be the Contractor's responsibility to determine the characteristics of electrical currents available to operate the mechanical equipment prior to ordering such equipment. All electrically operated equipment shall be designed for operation with the type of electric current available to the project.

C. It shall further be the Contractor's responsibility to locate, layout and make provisions for all openings required in precast or cast in place concrete slabs, etc., necessary to accommodate his work.

D. Do all excavation and backfilling required for the installation of piping and other mechanical work underground.

E. Provide labor, materials, tools, and services for a complete installation of equipment and systems specified herein and indicated on drawings.

F. All equipment shall be installed in accordance with the manufacturer's drawings and recommendations.

G. The Contractor shall furnish and install all rough-in work and make final connections to all equipment requiring water, drains, and other mechanical work required for connection to equipment furnished under this contract.

H. The equipment shall be properly prepared structurally and mechanically ready to receive a single connection for each of the various mechanical items with all plumbing, piping drains, traps, tailpieces, supply fittings, etc., internal to and part of the equipment installed by the equipment manufacturer or supplier.

I. Verify all connections and rough-in locations with the Architect and / or the equipment supplier or contractor prior to the start of their work. Do not scale plumbing drawings.

J. Contractor agrees to assume responsibility for liability, workmanship and quality of materials concerning work sublet to others. Before part of contract is sublet, submit to Architect in writing names of proposed subcontractors and obtain written approval.

K. Related Documents: General conditions, Supplemental General Conditions, and General Requirements are part of this division.

1.02 CODES AND FEES

A. All work shall be installed in accordance with the applicable provisions of the local codes, latest adopted International Plumbing Code.

B. The Contractor shall pay for fees and inspections as may be required for water, sanitary sewer and all other systems such as the sprinkler system requiring inspection by agencies having jurisdiction.

1.03 ELECTRICAL WORK

A. All control wiring and conduit not shown on Electrical drawings shall be furnished and installed under Division 22 according to the National Electrical Code and Division 26 requirements. See G.2.

B. All power wiring and conduit for items furnished under Division 22 shall be furnished and installed under Division 26. See G.1.

C. All disconnects shall be furnished and installed by Division 26.

D. Toggle switches for 1/2 HP motors and less shall be furnished and installed by Division 16.

E. Wiring and conduit for solenoid valves, and control transformers including the transformers shall be furnished and installed by Division 22.

F. Division 26 shall install all starters, toggle switches, disconnects, and all wiring to the respective motor or device. Wiring and conduit from starter to a controller shall be by Division 22.

G. Definitions

1. Power wiring: Line voltage circuitry rough-in including conduit, boxes, conductors, etc. between the overcurrent protection and the equipment including the connection of the starters.

2. Control wiring: Any voltage circuitry rough-in including conduit, boxes, conductors, etc. between control activator and the controller or starter.

H. Conduit: All power wiring and 120V control wiring shall be in conduit. Low voltage control wiring shall be installed in conduit where exposed, or in return air plenums, in masonry walls, or below slab.

1.04 RECORD DRAWINGS

A. The Contractor shall maintain a set of prints that reflect site conditions including location of valves, underground piping, equipment, etc. that have been changed to suit job conditions. The contractor shall prepare a corrected reproducible tracing of the project using the results of the record print. Final payment shall not be made until such document(s) is turned over to the architect upon completion of the project.

1.05 QUALITY ASSURANCE

A. Perform work of this section using skilled workers who are trained and experienced in the required crafts and who are knowledgeable and familiar with the specified requirements and the methods to be used for proper performance of the work.

1.06 COMPLETE WORK

A. Contractor shall provide and install all systems in complete working order. All items normally required for operation shall be provided.

1.07 SEISMIC DESIGN

A. All piping and equipment supports shall be installed according to Chapter 16 of the International Building Code.

B. Seismic restraints requirements shall be determined by building site classification.

PART 2 PRODUCTS

2.01 IDENTIFICATION

A. All pipe lines installed under the contract shall be clearly labeled to indicate their function and flow direction. Labels shall be applied by stencil, decal, printed tape, or equivalent method, and shall be so spaced that the lines may be traced from start to finish. Labels (where used) shall be Seton "Setmark" or approved substitute.

B. Round brass tags shall be provided to identify the function of each valve in the various piping systems, except valves for which the purpose is self evident. Tags shall be approximately 1½" in diameter, properly stamped and securely fastened to the valve. A valve tag list showing valve tag number, and valve type and function shall be framed under clear plastic glazing and placed in main mechanical room.

C. All starters and pushbutton stations shall be labeled to identify the equipment which they control, utilizing Kroy Duratype 240 SE industrial tape, and suitable labeling machine or approved substitute.

2.02 EQUIPMENT LIST, SHOP DRAWINGS AND SAMPLES

A. Submit to the Architect for approval, within 30 days after receipt of Notice to Proceed with the work, detailed shop drawings of all equipment and all material required to complete the project. The shop drawing shall be complete as described herein. The Contractor shall furnish the number of copies required by the General and Special Conditions of the Contract, but in no case less than six (6) copies.

B. **All shop drawings to be submitted at one time in a 3-ring binder with cover and drawing index sheet, or submitted electronically.**

C. The shop drawings shall be detailed, with dimensioned drawings or catalog cuts, showing construction, size, arrangement, operating clearances, performance characteristics and capacity. Each item of equipment proposed shall be a standard catalog product of an established manufacturer and of equivalent quality, finish, and durability to that specified. Submission material and all shop drawings for the various items of equipment shall be marked with the respective mark number or identification of the equipment shown on the drawing or in the specification.

D. Provide a cover sheet for all major equipment, including but not limited to, pumps, plumbing fixtures and water heaters, that shall list in detail all accessories called for in specifications and on drawings that are being supplied. Also, list operating capacities shown in schedules or described on drawings. Failure to list these items will result in resubmittal. A copy of a standard catalog will not be sufficient. Provide shop drawings for piping firestop details required in Division 220510.

E. Shop drawings shall show sizes and details of required concrete and steel machine foundation, location of anchor bolts, physical dimension of equipment, equipment weight or other pertinent data required for equipment support or installation.

F. The contractor shall verify all electrical requirements of equipment with the electrical service available before ordering said equipment.

G. Approved shop drawings do not mean that drawings have been checked in detail; said approval does not in any way relieve the Contractor from his responsibility or necessity of furnishing material or performing work as required by the contract drawings or specifications.

PART 3 EXECUTION

3.01 TESTS

A. Test all plumbing piping, following installation, but before it is covered or connected to the sewers or fixtures. Furnish necessary labor, materials and equipment for making test. All leaks disclosed by testing shall be reworked in an approved manner and the leaking system shall then be retested until proved tight under pressure. Test all systems for watertightness (or gas-tightness) as required by the authorities having jurisdiction, or in the absence of such requirements the minimum tests shall be made as follows:

1. Fill all sanitary drainage and vent piping with water and allow to stand thus filled for 3 hours without showing leaks. Piping may be tested in sections, but no sections shall be tested with less than a ten foot head.
2. Test all water supply piping by applying a hydro-static pressure of not less than 100 pounds per square inch or 1½ times the working pressure, whichever is greater.

3.02 COORDINATION

A. The plumbing work shall be installed as neatly as possible in the locations shown but shall be subject to such deviations, modifications and relocations as may be necessary to conform to the requirements of the architectural drawings and as necessary to avoid interferences with the structural work and the work of other trades, and interferences between the various trades. This shall be done at no cost to the Owner. No piping or equipment shall be installed which would require ceilings to be lower than required by drawings, unless approval is obtained from the Architect.

B. It is the responsibility of the General Contractor to coordinate the work of his subcontractors. To this end, the General Contractor shall require that the various subcontractors carefully examine and familiarize themselves with the architectural and structural drawings and drawings covering the work of other trades, and that they frequently consult with all other trades so that the work may be coordinated.

C. If necessary to coordinate and expedite the work, the Contractor shall prepare "interference drawings" and submit them to the Architect for approval. Such drawings shall show the work of the various trades involved, illustrate proposed details of construction and arrangement of equipment and apparatus, and clearly indicate any deviations from contract requirements.

D. Minor changes in arrangement may be made to suit unforeseen conditions, but no major deviation shall be made without written approval from the Architect. If any deviations are deemed necessary, submit all details of proposed changes and all reasons therefore, in writing, to the Architect for approval prior to making installation of such work.

E. Do not fabricate piping before interferences are verified. No extra will be allowed for piping fabricated in advance which cannot be used.

3.03 EXCAVATING AND BACKFILLING

A. Do all excavating and backfilling required for the installation of underground work required by the mechanical work.

B. Excavation depth for all trenches except water shall be not less than 12" and a separate trench is required for sewer, gas, and water. The distance between water and sewer lines shall not be less than 10 feet unless otherwise required by the Tennessee department of Health. Width of trench shall be not less than 18" wider than the pipe outside diameter. Minimum cover over top of water pipe shall not be less than 30".

C. Copper piping, PVC piping, shall be laid on a 6" bed of sand and backfilled with 12" of sand in 6" layers to 12" above top of pipe in areas not below slab or pavement. Complete backfilling with Tennessee Highway Class "B" aggregate to slab under building and outside of building to underside of pavement. The balance of the fill outside the building shall be clean earth thoroughly tamped and crowned to allow for subsequent settlement. Compact to 100% density under buildings and paved areas.

3.04 CUTTING AND REPAIRING

A. All chases, recesses, sleeves and other openings in masonry and concrete shall be built in as the construction work progresses, and it shall be the responsibility of the subcontractor to see that such chases, recesses, sleeves and other openings required for their work are properly located and installed. If this is not done by the subcontractor whose work required such accommodation, it shall be performed at his expense.

B. Structural members or finished work shall not be cut without the express permission of the Architect. Cutting shall be done neatly and patching or repairing shall match adjacent work.

3.05 PROTECTION AND CLEANING

A. Work shall be protected at all times. Pipe openings shall be closed with caps or plugs until permanent connections are made. Fixtures and equipment shall be covered, if necessary, to protect against dirt, water, chemical or mechanical damage or defacement. The installation of fixtures liable to damage shall be deferred by the Architect.

B. Upon completion of the work and after all tests have been made and piping systems proven tight, clean all fixtures and equipment, and leave in correct operating condition.

3.06 PAINTING

A. Painting of mechanical equipment and exposed piping in finished spaces, or exposed on the exterior, shall be finished as specified under Section 09, Finishes. All equipment exposed on the exterior furnished without factory finish shall be painted.

B. Equipment with a factory applied finish shall have scratches, chips, etc., primed and touched up with materials which will protect the surface and match the adjacent area.

3.07 OPERATING INSTRUCTIONS

A. Furnish and deliver to the Owner three sets of operating instructions for all equipment installed under this contract, including shop drawings, piping diagrams, wiring diagrams, maintenance recommendations and information concerning replacement parts. This information must contain plumbing contractor names, equipment supplier names, contact personnel, telephone

numbers, and facsimile telephone numbers. This information shall be contained in a three ring binder of suitable size, and labeled on the exterior with project name.

3.08 GUARANTEE

A. The Contractor shall guarantee all work to be in accordance with contract requirements and free from defective or inferior materials, equipment, and workmanship for a period of one year, and he shall guarantee that all equipment is of proper size and design and so installed as to produce the capacities and results specified and shown on the drawings.

3.09 SUBSTITUTIONS

A. Substitutions shall be allowed in accordance with Division 1. Substitution approval shall be at the sole discretion of the Engineer.

B. Contractor shall note on shop drawings all major differences from specified material or equipment.

C. The contractor shall be responsible to verify that all dimensions, weights, and electrical requirement of substituted materials and equipment meet project requirements.

D. All requests for substitution must be submitted to the architect and engineer a minimum of 14 calendar days prior to project bid date. Such submission does not constitute approval. Only items or manufacturers specifically stated in the project specifications, drawings or addenda for use shall be considered as approved.

END OF SECTION

SECTION 22 05 10

BASIC MATERIALS AND METHODS - PLUMBING

PART 1 GENERAL

1.01 WORK INCLUDED

A. General provisions of Division 22, General and Supplementary Conditions, and General Requirements of Division 1, apply to this section.

1.02 BASIC REQUIREMENTS

A. Equipment and materials used in the work shall be in accordance with the contract documents, of the best quality and grade for use intended, shall be new and unused and shall be the manufacturer's latest standard or current model for which replacement parts are readily available.

B. Work shall be installed under the constant supervision of a competent superintendent and by skilled and competent mechanics experienced in the trade that contractor is practicing.

C. All apparatus and equipment shall be installed and connected in accordance with the best engineering practices and in accordance with the manufacturer's recommendations. All auxiliary piping, water seals, valves, electrical connections, etc., recommended by the manufacturer or required for proper operation shall be furnished and installed complete.

D. The work of this section is subject to the requirements of the Plumbing General Provisions and the General Provisions in Division 1.

PART 2 PRODUCTS

2.01 SLEEVES AND PLATES

A. All pipes that pass through masonry partitions and walls and concrete floor slabs shall be installed with standard weight galvanized steel sleeves. Sleeves through floors shall be long enough to project a minimum of 2" above finished floor. Sleeves shall be large enough for pipe, pipe insulation and required fire caulking. Sleeves in concrete shall be accurately located in the forms and secured in place to prevent displacement during pouring of concrete. Sleeves below grade in exterior walls shall be Link-Seal with wall penetration seal or approved substitution.

B. Sleeves in finished spaces shall finish flush with the finished wall surface. Sleeves for insulated water pipe shall be large enough to accommodate the insulation.

C. Pipes passing through masonry walls and partitions in finished spaces shall be fitted with metal escutcheons or collar plates. Plates occurring in painted walls or ceiling shall be prime coated for painting; other plates shall be chromium plated.

D. All pipe penetrations of fire rated floors or walls are to be protected. Space between metal pipe and wall or sleeve shall be protected with Hilti Fire Barrier Penetration Sealing System or approved substitute. Installation shall be in accordance with the manufacturers recommendations for the hourly fire rating of the partition. The system shall be U.L. listed. For insulated domestic water, continue insulation and vapor barrier through wall. The sleeve through the wall shall be large enough for the pipe, insulation and fire caulking.

E. PVC pipe passing through rated walls, ceilings or floors shall have Hilti UL Listed Fire Protection System or approved substitute. System number shall be as required by construction and rating.

2.02 ACCESS PANELS

A. Furnish steel access panels prime coated, not smaller than 12" for single valve and 12" X 24" or 18" X 18" for two or more valves, for access of concealed valves, traps, clean outs, unions, etc., where no other means of access is shown or specified. Access panels shall be turned over to the general contractor for installation. Access panels shall be field painted.

B. Panels shall be Milcor, or approved substitute, with key operated lock, and of proper design and style for installation in wall, floor or ceiling construction called for on drawings. Access panels in fire rated construction shall have a UL label Class B rating. All panel styles to be verified by the Designer. Locks shall be modified for use with master key.

2.03 PIPE FITTINGS

A. Fittings for copper pipe shall be wrought copper or cast bronze, equal to those manufactured by Mueller Brass Co., Bridgeport Brass Co., NIBCO, or approved substitute. Pipe size 2½" and larger shall be flanged type.

B. Dielectric Fittings - Dielectric Fittings or Union between dissimilar metals shall be EPCO, or approved substitute. Provide 3/AWG copper bonding strap around each dielectric union.

C. Unions:

1. Unions, either screwed or flange, shall be installed on each side of all special valves, regulators, etc., on one side of each check valve and each trap, and at all equipment such as coils, tanks, compressors, pumps, etc., so that such equipment may be readily disconnected. No unions shall be placed in a location which will be inaccessible after completion of the building.
2. Where flanged valves, regulators, etc., do not permit the removal of flange bolts, two such devices shall be separated by a spool.
3. Connections between pipes of dissimilar metals shall be made with Dielectric (insulated) unions.

2.04 METERS, GAUGES AND THERMOMETERS

A. Gauges and Test Plugs

1. Water pressure gauges shall be Ashcroft, or approved substitute, drawn case type 4½" dial size, and range as shown on the drawings.
2. All temperature and pressure gauge test connections indicated on the drawings shall have Universal Lancaster Needle Adapter and brass pressure test plug. Brass test plugs shall be installed at locations shown on the drawings for occasional tests. Furnish two thermometers and pressure gauges and needle adapter for each pressure temperature range indicated on the drawings.

B. Thermometers

1. Water Thermometers shall be red reading, mercury type, with 9" scale length, and shall be Moeller 17103 or 27103, or approved substitute, as required. The range shall be as shown on the drawings.

PART 3 EXECUTION

3.01 GENERAL

A. Run exposed piping parallel to the principal parts of the building. Piping shall be run concealed when provisions are made in floors, walls, ceilings and chases through all finished spaces, except at fixture connections and where specifically noted otherwise. Do not run water pipe below ground floor slab except where indicated specifically on plans.

B. Piping and equipment shall be kept as close as possible to ceilings, walls, columns, etc., and shall be installed in such an orderly manner as to take up a minimum of space and allow a maximum of headroom, and all offsets, fittings, etc., required to accomplish this shall be furnished and installed, whether or not each offset and fitting is specifically shown or noted. Minimum clearances on exposed piping shall be maintained as specified under "Piping Clearances" herein.

3.02 PIPE INSTALLATION

A. Service pipe, valves, fittings, etc., shall be so installed that after the insulation cover is applied there will be not less than ½" clear space between the finished covering and other work and between the finished covering of parallel and adjacent pipes. The clearances on uninsulated pipe shall be measured from the point of greatest projection of the pipe fittings.

B. Fastenings to masonry walls shall be made with metal expansion sleeves, cinch anchors, toggle bolts, or equal. Fastenings to concrete shall be made with metal expansion sleeves, metal inserts. Wood plugs will not be acceptable in any case.

3.03 JOINTS IN PIPE

A. PVC pipe joints shall be made with cement recommended by pipe manufacturer. All joints shall be cleaned with approved solvent.

B. Type "L" copper pipe joints, except as otherwise specifically noted, shall be made with 95-5 plumber's solder and noncorrosive paste flux. Acid core solder shall not be used. Tubing shall be square cut on a sawing vise and reamed to remove burrs. Outside and inside of fittings and outside of pipe shall be well cleaned and steel wool used before soldering. Soldering operations shall be performed strictly in accordance with the recommendations of the manufacturer of the pipe and fittings. Joints in copper pipe Type "K" below grade shall be made with high temperature solder, silver solder, sil-fos, or equal.

C. Connections of copper pipe to ferrous pipe shall be made with Dielectric unions. Connections of metal pipe to non-metallic pipe shall be made with adapters as specified hereinbefore. Connections of copper piping to equipment requiring threaded connections shall be made with adapters as specified hereinbefore.

D. Unions for brass or copper pipe shall be all brass, and for steel pipe shall be malleable iron with brass insert. Unions 2" and smaller shall be ground joint type.

END OF SECTION

SECTION 22 05 29

SUPPORTS AND ANCHORS - PLUMBING

PART 1 GENERAL

1.01 WORK DESCRIPTION

A. Provide all labor, equipment, materials, etc. required to complete installation as specified herein and/or shown or scheduled on the drawings.

B. Support (1) from wood using coach screws on open construction and hanger flanges on sheeting, (2) from concrete using inserts, (3) from steel using beam clamps, rivets or bolts, (4) from concrete blocks using toggle or through bolts. Fasten supports to building in following order of preference: (1) steel framing, (2) concrete, (3) wood framing, (4) masonry, (5) wood sheathing. Do not support from roof deck without approval. Do not use plastic wall anchors. All hangers, rods, and inserts shall be Underwriters Laboratories approved for the service intended and shall meet MSS #SP-58 & 69.

C. Adhesives are not acceptable as mounting or supporting devices.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. General Provisions, Section 220500.

B. Basic Materials and Methods, Section 220510.

PART 2 PRODUCTS

2.01 HANGERS

A. Use adjustable swivel ring band type for pipe 2½" and smaller, except C.I.. For pipe 3" and larger and for cast iron pipe, unless otherwise noted, use adjustable steel, clevis type.

B. At each hanger on insulated pipe provide (1) pipe covering protection saddles on hot lines and (2) insulation shields on cold lines.

C. Saddles to be 16 gauge, minimum 12° saddles arc with the following minimum saddle lengths:

Pipe Size	Minimum Saddle Length
1	12"
2	12"
3	12"
4	12"
6	12"

D. Hanger surface material shall be such that there will be no possibility of electrolytic corrosion between hanger and pipe.

E. Anchors requiring explosive charges shall not be used. Phillips "Red-head" shields can be used for loads under 300 lbs.

PART 3 EXECUTION

3.01 HORIZONTAL PIPING SUPPORT SCHEDULE

Pipe Size	Rod Dia.	Copper and PEX Max. Spac.	PVC Max. Spac.
1) up to ½"	¼"	4ft.	3½ ft.
2) 3/4" to 1"	3/8"	5ft.	4ft.
3) 1¼"	3/8"	7ft.	5ft.
4(1½"	3/8"	8ft.	5ft.
5) 2"	3/8"	8ft.	5ft.
6) 2½"	½"	9ft.	6ft.
7) 3"	½"	12ft.	6ft.
8) 4"	5/8"	14ft.	6 ½"

3.02 METHOD

A. Support PVC pipe with hanger, or pier, located close to the joint; use one support for each pipe length, or every other joint, whichever is closer.

B. Provide hanger within 18" of each elbow, also provide hanger within 18" of connection to each piece of equipment.

C. Support vertical pipe at base and at each floor. In addition, 1" or smaller copper pipe shall be supported at 5 foot intervals.

D. When supporting PVC pipe, provide 18 ga. 12" long shield at each hanger.

E. Pipes passing thru walls shall not bear on building construction.

F. All floor-mounted equipment shall be mounted on a reinforced concrete base covering the complete floor area of equipment. This concrete base shall be 4" high and shall extend 3" beyond the equipment on all sides. Provide all necessary anchor bolts and templates. Provide ¼" thick layer of non-shrinking grout between floor-mounted machinery and concrete pad. Where equipment mounts on structural steel, provide shims.

G. Any piece of equipment installed in a finished ceiling, or wall area, shall be supported independently of the building finish. Ceiling-mounted items shall be supported directly from the building structure except, with Engineer's written approval, can be from ceiling suspension system if the hanger load is less than 10 lbs.

H. Suspended equipment shall be supported from building structure by adjustable rods.

I. To aid in PEX piping support, PEX piping shall rest in a continuous metal saddle secured to PEX piping with stainless steel zip bands.

END OF SECTION

SECTION 22 07 00

INSULATION - PLUMBING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. General provisions of the Contract, General and Supplementary Conditions, and General Requirements, apply to this section.

1.02 WORK INCLUDED

A. Work required under this section consists of insulation for piping and duct systems and equipment as hereinafter specified.

B. The work of this section is subject to the requirements of the Mechanical General Provisions and Basic Material Specifications.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Plumbing, Section 220800

1.40 BASIC REQUIREMENTS

A. All materials used for insulation of pipe and equipment covered in this section shall be UL listed. Fire hazard ratings shall be as follows:

1. Flame spread of 25, and smoke development of 50 for all insulation located in ceiling plenums or rooms utilized for return air plenums.

2. Flame spread of 25 and smoke development of 200 for other pipe and equipment insulation.

B. Increase the insulation thickness of ½" on all piping outside the building insulation envelope and weatherproof with 0.016" thick aluminum jacket with aluminum fitting covers. This piping shall be protected with electric heat tape installed under the insulation.

C. All insulation and thicknesses are selected to meet the 2006 International Energy Conservation Code.

D. Install 0.016" thick aluminum jacket on all pipe insulation in mechanical rooms 7'-0" from finished floor.

PART 2 PRODUCTS

2.01 FIBERGLASS FOR PIPE

A. Provide 4-pound density 500°F snap-on type glass fiber with ASJ-SSL factory applied jacket reinforced with vapor barrier. Fitting, including ells, valves and tees, shall be insulated with snap-on preformed insulation the same thickness as pipe insulation and finished with glass fabric and vapor barrier mastic. Use foam glass half sections at hanger saddle on pipe sizes 2" and larger to eliminate insulation deformation. Insulation to have a minimum "R" value of 4.0 per inch. Provide this insulation for the following:

1. Domestic cold water 1" thick on all piping 3" and larger.

2. Cold condensate drains - 1" thick.

PART 3 EXECUTION

3.01 GENERAL

A. Install all insulation products in strict accordance with manufacturer's instructions.

B. Cover all joint, rips, tears, punctures, staples, insulpins or breaks in vapor barrier jacket with 4" wide woven glass fabric tape embedded in vapor barrier fire resistant mastic.

C. No insulation shall be cut where a hanger is located.

D. At water service entrance rooms valves, flanges, backflow preventers, strainers and Victaulic couplings shall be insulated using Armaflex donuts that shall then be covered with sheet or oversized tubular insulation.

END OF SECTION

SECTION 22 08 00

PLUMBING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. General provisions of the Contract, General and Supplementary Conditions, and General Requirements, apply to this section.

1.02 DESCRIPTION OF WORK

A. Labor, material, equipment and services necessary to provide a complete plumbing system.

B. Examine carefully architectural, equipment, electrical, mechanical and structural drawings and each division of this specification for items not a part of this plumbing section which may require plumbing connections. Unless explicitly indicated to the contrary, Contractor shall provide necessary supply, waste and vent lines, and make final connections to such items. It shall be Contractor's responsibility to locate supply, waste and vent lines, to such items in conformity with approved manufacturer's rough in drawings.

C. Related Work Specified Elsewhere:

1. General Provisions, Section 220500.
2. Basic Materials and Methods, Section 220510.
3. Insulation, Section 220700.
4. Electrical Connections, Division 26.

1.03 PLUMBING SYSTEMS

Work included under this section consists of plumbing work, principal systems of which are as follows:

A. Water Supply System: Make connections to existing public water main. Extend and connect hot and cold water to fixtures and equipment provided under this and other sections.

B. Waste Piping System: Provide sanitary waste drainage and vent piping including connecting fixtures provided under this and other sections.

C. Plumbing Fixtures: Provide plumbing fixtures, trim and related items such as supplies, traps, drains, cleanouts, water closet seats and covers, fixture supports and other accessory items.

D. Condensate Drainage System: Provide complete collection system for condensation from HVAC equipment and route to nearest floor drain or as otherwise indicated on drawings.

1.04 CONNECTIONS FOR EQUIPMENT FURNISHED BY OTHERS

A. The Contractor shall furnish and install all roughing-in connections for all equipment requiring water, drains, etc. The equipment manufacturer shall furnish shop drawings to the Contractor who shall rough-in accordance with these shop drawings, and make final connections. Plumbing requirements at locations indicated are based only on specified equipment. Rough-ins may vary slightly pending equipment purchased. Verify rough-ins with shop drawings or purchased equipment.

PART 2 PRODUCTS

2.01 WATER CIRCULATING PUMPS

A. In-the-line circulators to be all-bronze construction and provided with flanged connections; hardened steel shafts; bronze-sheathed, diamond-bored sleeve bearing; bronze impellers; and mechanical seals.

B. Motors to be flexible-coupled, supported from pump casing and provided with a manual motor starter complete with thermal overload protection.

C. Units shall come complete with strap-on aquastats to control pump operation.

D. Electrical characteristics and capacities shall be as scheduled on drawings.

E. In-line-circulators shall be by Bell and Gossett, Grundfos or approved substitute.

2.02 BACKFLOW PREVENTERS

A. Backflow preventers on lines 3/4" through 2" pipe size shall be Watts No. 900 Series, Wilkins Model 975ELS, or approved substitute, complete with gate valves, strainers, test cocks installed with required air gap at vent opening to drain line.

B. Backflow preventers on lines 2½" through 6" pipe size shall be Watts No. 909 Series, Wilkins Model 375FSC or approved substitute, complete with gate valves, test cocks installed with required air gap at vent opening to drain lines. Contractor shall install line size strainer on inlet side of the assembly.

C. All backflow preventers shall be complete with funnel and required air gap. Pipe discharge to nearest suitable drain.

D. All backflow preventers must be installed above grade in non-flooding locations.

2.03 SUMP PUMPS

A. Pump in elevator pits to be 1/3 horsepower, 115-volts, single phase, 303 stainless steel shaft and bronze impeller and complete with check valve and ball valve in discharge line. PUMP SHALL BE 1¼" Series 1400 Weil with mechanical seal and mercury type float switch control w/3 prong ground, or approved substitute.

2.04 INTERIOR WATER PIPING

A. Piping above Ground: Piping 3" and larger shall be ASTM B88 hard drawn Type L copper assembled with wrought copper solder fittings. Piping smaller than 3" shall be crosslinked polyethylene (PEX) with cold expansion joint fittings as manufactured by Uponor or approved substitute. Crimped fitting PEX piping will not be accepted. All risers and horizontal piping 1" and larger shall be stick type, with roll type for 3/4" and ½" piping for fixture connections from multi-point tees.

B. Piping Below Slab: All piping shall be Type K Soft Drawn Copper, ASTM B-88.

C. Brass or bronze adapter fitting shall be used where necessary and shall be iron pipe size and thickness where required for fixture or equipment connections. Connections of copper pipe to ferrous pipe shall be made with dielectric unions or couplings.

2.05 MANUAL VALVE

A. Valves for Domestic Water:

1. Ball valves shall be used in sizes to and including 2 1/2" size. Valves shall be designed for service without removing from line and shall have Teflon seats.
2. Valves 3" and larger shall be butterfly type with 150 PSI bubble-tight shutoff. Bronze Disc, EPT seat, multi- position handle and one-piece stainless steel stem.
3. Check valves shall be horizontal swing type, with grindable seat and metal disc. Size 2½" and smaller shall be Y pattern. All bronze size 3" and larger shall be iron body with bronze trim.
4. Valves shall be of same manufacture as PEX piping.

2.06 INTERIOR SANITARY SEWERS

A. Soil, waste and vent piping inside the building and to a point 5 feet outside the building walls shall be Schedule 40 PVC with D.W.V. fittings.

2.07 CONDENSATE DRAINAGE

A. Condensate drainage piping below grade shall be schedule 40 PVC with DWV fittings.

2.08 CLEANOUTS

A. Cleanouts shall be Zurn, Wade, J.R. Smith, or approved substitute, and shall be installed full size of trap or pipe. Full size Y and T branches shall be provided for cleanouts as required by conditions at the building. Cleanout plugs shall be cast iron with neoprene or lead seals and shall be lubricated.

B. Cleanouts: (Zurn numbers listed):

1. Exterior: ZN-1400-2, cast iron cutoff ferrule with round scoriated frame and cover, secured.
2. Finished Concrete Floors: ZN-1400-2, Neolock Connection, round Nikaloy scoriated frame and cover.
3. Ceramic Tile Floors: ZN-1400-3 Neolock Connection, with round Nikaloy scoriated frame and cover.
4. Resilient Tile Floors: ZN-1400-7, Neolock Connection, with round recessed Nikaloy smooth round frame and cover.
5. Wall: ZANB-1460-9 smooth round stainless steel access cover with securing screw.
6. Carpet Floor: ZN1400-15 Neolock Connection with round Nikaloy scoriated frame and cover with carpet marker.
7. Note: Use clamping device on cleanouts than occur in floors having waterproof membrane.

2.09 PRESSURE REDUCING VALVES

A. Pressure reducing valves shall be installed as indicated on the drawings. The reducing valves shall be installed complete with inlet strainer, 3-valve bypass, and pressure gauges on the reduced and incoming pressure side. See detail on plumbing drawings.

B. Pressure reducing valves for water service 2" and smaller shall be Wilkins 600 or Watts U5B suitable for reducing pressure from approximately 300 pounds to 40 pounds. 3" and 4" water service, Watts 127-W or 2-1/2" & 3" Wilkins 500 or 4" Cal-Val 690-01-AB.

C. Pressure reducing valves shall be Watts, Wilkins, Cal-Val, or approved substitute.

2.10 PRESSURE GAUGES

A. Pressure gauges for water shall be 4½" dial size Ashcroft 1000, or approved substitute, with range required or noted on drawings. Install with gauge cock.

2.11 ELECTRIC WATER HEATERS

A. The electric water heaters up to 120 gallons size shall be U.L. Listed, fully automatic electric type with glass lined tank, insulated jacket, magnesium anode, drain valve, vacuum breaker in cold water piping if heater is not equipped with dip tube, insertion type high limit thermostat, insertion type control thermostat for each heater, ASME Code temperature and pressure relief valve installed in the top of the tank with discharge line to floor drains, janitor's sink or other suitable drain. All heater elements shall be insertion type for the electric power service noted on the drawings. The tank size and number of elements shall be as called for on the drawings. The units shall be Lochinvar, State, or approved substitute. Verify voltage available with the electrical drawings.

2.12 SHOCK ABSORBERS

A. Provide sealed air chamber type shock absorbers by Zurn in water lines which supply flush valves and solenoid valves, where solenoid valves are used. Placement of absorbers and size shall be as shown on drawings.

2.13 PLUMBING FIXTURES

A. Contractor shall examine Architectural drawings for exact location and number of plumbing fixtures required. Architect/Engineer shall be notified of any discrepancies between the architectural and plumbing drawings prior to bidding. Failure to examine all drawings will not constitute a change order for fixtures to be added which were shown on one but not the other.

B. Refer to Architectural plans for rough-in dimensions. Do not scale plumbing drawings for rough-in dimensions.

C. Provide plumbing fixtures and drains as listed and described on drawings. Fixtures by Zurn, Kohler or American Standard will be considered.

D. All fixtures designed for handicap use shall be mounted at handicap height as indicated by handicap code enforced in local area.

E. China or enamel fixtures to be white color, unless noted otherwise.

F. Drains to be Zurn, J.R. Smith,Wade or Watts.

G. Stainless Steel sinks shall be Elkay, or approved substitute.

H. Faucets shall be Symmons, Delta, T & S Brass, Zurn, Chicago or approved substitute.

I. Flush valves shall be Zurn, Sloan, Toto or approved substitute.

2.14 HANDICAP PLUMBING FIXTURE REQUIREMENTS

A. Plumbing fixtures designated for handicap usage shall be mounted at handicap height in accordance with the North Carolina Handicap Code and the Americans with Disabilities Act. Fixture heights and requirements are as follows:

1. Adult fixtures

a. Water closet - Height from finished floor to top of seat shall be 17"-19". Flush control shall not be higher than 44" above finished floor.

b. Lavatory - Lavatory rim shall be 34" maximum above finished floor maintaining 27" clear space below the basin at 8" from the front rim of the bowl toward the wall.

PART 3 EXECUTION

3.01 DOMESTIC WATER PIPING

A. From cold water main extend distribution mains, risers, and branches to all equipment and fixtures requiring cold water connections. From hot water generators extend similar lines to all equipment and fixtures requiring hot water connections.

Install a valve in each major branch take-off in the hot and cold water distribution mains and elsewhere as necessary for control of the system or as shown on the drawings.

B. Water supply piping shall be run so that the system can be drained at the low point by opening valves; provide drain valves at low points, 3/4" size if not otherwise noted. Run piping concealed in chases, pipe shafts, and space above ceilings throughout finished spaces, except at fixture connections and elsewhere as specifically noted otherwise.

3.02 CHLORINATION OF DOMESTIC WATER LINES

A. After the domestic water piping system has been tested and cleaned, the system shall be sterilized in accordance with the requirements of the State Department of Public Health by the following method:

1. Introduce HTH solution, chlorine gas, or similar chlorination agent in sufficient quantity to produce a residual of 50 ppm of chlorine, as determined by residual chlorine tests at the ends of lines, and allow to stand for not less than 24 hours. Fill the lines slowly and open and close all valves while the chlorine is being introduced into the system.

2. After the disinfecting solution has been left standing for 24 hours, flush out the system until all traces of the solution are removed. If after flushing out the system, bacteriological samples are not satisfactory, repeat the disinfection process until satisfactory bacteriological samples can be obtained.

B. Disinfection of new supply mains shall be performed before these mains are connected to the existing water supply mains. Where connecting into the existing mains and it is not practical to include the connecting pieces (i.e., pipe, fittings, and valves) in the normal disinfecting process, these connecting pieces shall be swabbed with chlorine solution containing not less than 100 ppm available chlorine prior to making the connections.

3.03 WASTE VENT AND DRAINAGE

A. Use reducing fittings for changes in pipe size.

B. Fittings for waste, vent, and drainage piping to be drainage pattern type.

C. Soil, waste, and vent piping above ground shall be concealed in walls, chases, pipe shafts and ceiling spaces, except in equipment rooms and similar unfinished areas and elsewhere as specifically indicated otherwise. All soil and waste piping inside the building shall be run with a uniform drop of not less than 1/8" per foot, using ¼" per foot where possible.

D. Vertical vent lines shall be carried through the roof or connected to adjacent vent lines as indicated. Vents shall terminate approximately 12" above finished roof lines and shall be flashed with base and sleeve type into top of vent pipe. Collect vents where possible to minimize the number of vents extending through roof.

3.04 CLEANOUTS

A. Locate line size cleanouts, at base of each soil and waste stack; at each change in direction in soil, waste and drain lines; and in all horizontal drain lines, with spacing not to exceed 50' inside the building and 75' outside the building.

B. Cleanouts not accessible, which cannot be made easily accessible otherwise, shall be extended up through floor or wall.

3.05 ELECTRICAL GROUND

A. This Contractor shall make provisions for maintaining the electrical ground properties of water lines by strapping over valves or equipment whose removal for service work in future would break grounding service. Strapping over shall be done with a length of braided copper cable which shall be brazed to pipe at either end.

3.06 FIXTURE CONNECTIONS

A. Connect to plumbing fixtures and equipment provided under this and other sections of specifications.

B. See schedule on plans for connections sizes to fixtures.

C. Each fixture, floor drain, and piece of equipment requiring connection to drainage system to have separate traps installed as close to fixture as possible.

D. Provide deep seal P-traps under floor drains.

E. Where required by code, install trap primers and all connecting piping on floor drains in lieu of deep seal P-trap.

3.07 CLEANING AND TESTING

A. Test plumbing systems in accordance with test procedures and pressure as specified in General Provisions.

B. Clean and sterilize domestic water supply in accordance with test procedures as specified in General Provisions.

END OF SECTION

SECTION 23 05 00

GENERAL PROVISIONS - HVAC

PART 1 GENERAL

1.01 WORK INCLUDED

A. It shall be the contractor's responsibility to furnish and install complete all systems, equipment, and related items described under Division 23.

B. It shall be the Contractor's responsibility to determine the characteristics of electrical currents available to operate the mechanical equipment prior to ordering such equipment. All electrically operated equipment shall be designed for operation with the type of electric current available to the project.

C. It shall further be the Contractor's responsibility to locate, layout and make provisions for all openings required in precast or cast in place concrete slabs, etc., necessary to accommodate his work.

D. Do all excavation and backfilling required for the installation of piping and other mechanical work underground. This work shall comply with all applicable provisions of "Excavating and Backfilling" and Division 31, EARTHWORK.

E. Provide labor, materials, tools, and services for a complete installation of equipment and systems specified herein and indicated on drawings.

F. All equipment shall be installed in accordance with the manufacturer's drawings and recommendations.

G. The Contractor shall furnish and install all rough-in work and make final connections to all equipment requiring exhaust systems, ductwork and other mechanical work required for connection to equipment furnished under this contract.

H. The equipment shall be properly prepared structurally and mechanically ready to receive a single connection for each of the various mechanical items with all ductwork, etc., internal to and part of the equipment installed by the equipment manufacturer or supplier.

I. Verify all connections and rough-in locations with the Architect and / or the equipment supplier or contractor prior to the start of their work.

J. Contractor agrees to assume responsibility for liability, workmanship and quality of materials concerning work sublet to others. Before part of contract is sublet, submit to Architect in writing names of proposed subcontractors and obtain written approval.

K. Related Documents: General conditions, Supplemental General Conditions, and General Requirements are part of this division.

1.02 CODES AND FEES

A. All work shall be installed in accordance with the applicable provisions of the local codes, latest adopted International Mechanical Code, NFPA, UL, ASTM, ASHRAE, SMACNA, ASME and ANSI.

B. The Contractor shall pay for fees and inspections as may be required for systems requiring inspection by agencies having jurisdiction.

1.03 ELECTRICAL WORK

A. All control wiring and conduit not shown on Electrical drawings shall be furnished and installed under Division 23 according to the National Electrical Code and Division 26 requirements. See G.2.

B. All power wiring and conduit for items furnished under Division 23 shall be furnished and installed under Division 26. See G.1.

C. All disconnects shall be furnished and installed by Division 26.

D. Toggle switches for 1/2 HP motors and less shall be furnished and installed by Division 26.

E. Wiring and conduit for solenoid valves, and control transformers including the transformers shall be furnished and installed by Division 23.

F. Division 26 shall install all starters, toggle switches, disconnects, and all wiring to the respective motor or device. Wiring and conduit from starter to a controller shall be by Division 23.

G. Definitions

1. Power wiring: Line voltage circuitry rough-in including conduit, boxes, conductors, etc. between the overcurrent protection and the equipment including the connection of the starters.

2. Control wiring: Any voltage circuitry rough-in including conduit, boxes, conductors, etc. between control activator and the controller or starter.

H. Conduit: All power wiring and 120V control wiring shall be in conduit. Low voltage control wiring shall be installed in conduit where exposed, or in return air plenums, in masonry walls, or below slab.

I. Smoke Detectors and Firestats

1. Smoke detectors shall be furnished and installed by Division 23 unless the project has a fire alarm system, then smoke detectors shall be furnished by Division 26, installed in ductwork by Division 23. All wiring and conduit from detector to fan shall be considered control wiring. 110 Volt wiring to the detector shall be power wiring. Wiring from the detector to fire alarm system shall be furnished and installed by Division 26.

2. All firestats shall be furnished, installed, and wired by Division 23.

1.04 RECORD DRAWINGS

A. The Contractor shall maintain a set of prints that reflect site conditions including location of valves, dampers, underground piping, ductwork, equipment, etc. that have been changed to suit job conditions. The contractor shall prepare a corrected reproducible tracing of the project using the results of the record print. Final payment shall not be made until such document(s) is turned over to the architect upon completion of the project.

1.05 QUALITY ASSURANCE

A. Perform work of this section using skilled workers who are trained and experienced in the required crafts and who are knowledgeable and familiar with the specified requirements and the methods to be used for proper performance of the work.

1.06 COMPLETE WORK

A. Contractor shall provide and install all systems in complete working order. All items normally required for operation shall be provided.

PART 2 PRODUCTS

2.01 IDENTIFICATION

A. All pipe lines installed under the contract shall be clearly labeled to indicate their function and flow direction. Labels shall be applied by stencil, decal, printed tape, or equivalent method, and shall be so spaced that the lines may be traced from start to finish. Labels (where used) shall be Seton "Setmark" or approved substitute.

B. Round brass tags shall be provided to identify the function of each valve in the various piping systems, except valves for which the purpose is self evident. Tags shall be approximately 1½" in diameter, properly stamped and securely fastened to the valve. A valve tag list showing valve tag number, and valve type and function shall be framed under clear plastic glazing and placed in main mechanical room.

C. All starters and pushbutton stations shall be labeled to identify the equipment which they control, utilizing Kroy Duratype 240 SE industrial tape, and suitable labeling machine or approved substitute.

D. All air units, fans, etc., shall be labeled with drawing mark number and with description of area served, utilizing engraved plastic laminate nameplates. Nameplates shall be Seton “Setonply” or approved substitute.

E. All air unit thermostats shall be labeled with proper mark number identifying it with air unit it serves, utilizing Kroy Duratype.240 SE industrial tape, and suitable labeling machine or approved substitute.

2.02 INDOOR ENVIRONMENTAL QUALITY - LOW EMITTING MATERIALS

A. All adhesvise and sealants used on the interior of the building (inside the weatherproofing and applied on-site) shall comply with “South Coast Air Quality Management District 9SCAQMD) Rule #1168", current VOC limits.

B. Paints and coatings used on the interior of the building shall comply with the following criteria for VOC limits:

1. Architectural paints, coatings and primers - Green Seal Standard GS-11, Paints, 1st Edition 5/20/93.

2. Anti-corrosive and anti-rust paints - 250 g/l per Green Seal Standard GC-03, Anti-Corrosive Paints, 2nd Edition, January 7, 1997.

2.03 SERVICE AND MAINTENANCE CONTRACT

A. The Contractor shall make arrangements with an independent service and maintenance contractor, “**other than the project mechanical contractor**” and as approved by the Architect, to perform all the required servicing and maintenance of the heating, ventilating and air conditioning system, without cost to the owner, for a period of one year after date of substantial completion. The name of the service contractor shall be part of submittals.

B. The servicing shall be complete in every respect and shall include but not be limited to the following: Replacing or washing of all filters as required for proper equipment operation, replacing bad belts, compressors, bearings, motors, controls, electric heaters, refrigerant specialties, couplings; cleaning drain pans and piping; replacing refrigerant and oil, bearing lubrication, and keeping equipment reasonably clean.

C. This service work shall be performed a minimum of three times a year. Filters may need changing more than 3 times depending on conditions. A written report shall be submitted to the Owner describing each visit. The date the service work starts shall be clearly identified in close out documents.

2.04 EQUIPMENT LIST, SHOP DRAWINGS AND SAMPLES

A. Submit to the Architect for approval, within 30 days after receipt of Notice to Proceed with the work, detailed shop drawings of all equipment and all material required to complete the project. The shop drawing shall be complete as described herein. The Contractor shall furnish the number of copies required by the General and Special Conditions of the Contract, but in no case less than six (6) copies.

B. **All shop drawings to be submitted at one time in a 3-ring binder with cover and drawing index sheet.**

C. The shop drawings shall be detailed, with dimensioned drawings or catalog cuts, showing construction, size, arrangement, operating clearances, performance characteristics and capacity. Each item of equipment proposed shall be a standard catalog product of an established manufacturer and of equivalent quality, finish, and durability to that specified. Submission material and all shop drawings for the various items of equipment shall be marked with the respective mark number or identification of the equipment shown on the drawing or in the specification.

D. Provide a cover sheet for all major equipment, that shall list in detail all accessories called for in specifications and on drawings that are being supplied. Also, list operating capacities shown in schedules or described on drawings. Failure to list these items will result in resubmittal. A copy of a standard catalog will not be sufficient. Shop drawings for controls shall contain a detailed sequence of operation. Provide shop drawings for piping firestop details required in Division 230510.

E. Shop drawings shall show sizes and details of required concrete and steel machine foundation, location of anchor bolts, physical dimension of equipment, equipment weight or other pertinent data required for equipment support or installation.

F. The contractor shall verify all electrical requirements of equipment with the electrical service available before ordering said equipment.

G. Approved shop drawings do not mean that drawings have been checked in detail; said approval does not in any way relieve the Contractor from his responsibility or necessity of furnishing material or performing work as required by the contract drawings or specifications.

2.05 TEST AND BALANCE OF AIR SYSTEMS

A. The Contractor shall make arrangements with an independent Balancing Agency to balance all air flow systems to the flow rates indicated on the Drawings. This shall include all air handling unit fans, supply fans and exhaust fans. The Balancing Agency shall be one normally engaged in such work. The agency shall be **AABC or NEBB certified**.

B. The contractor shall **submit a complete resume of the Balancing Agency for approval** by the Architect and Engineer. The resume shall contain examples of work, references, personnel available, and certifications.

C. The Balancing Agency shall prior to balancing inspect the work in place and prepare a report to the mechanical contractor with a copy to the Architect of work to be completed before balancing can start. Heating and cooling equipment shall be fully operational before balancing.

D. The Balancing Agency shall record the test results in tabulated formats for both cooling and heating conditions and submit two (2) copies to the Architect for approval. These results shall include, as a minimum, the following:

1. Test and record fan total CFM (design and actual)
2. Test and record fan outside air CFM (design & actual.)
3. Test and record fan suction static pressure and fan discharge static pressure (actual.)
4. Test and record static pressure on both sides of all filters and coils (actual.)
5. Test and record fan RPM (design and actual.)
6. Record fan sheave, motor sheave, pitch diameter after adjustment (if variable), center line to center line distance from fan shaft to motor shaft, belt size, and number of belts (actual.)
7. Change sheaves, pulleys, and belts, if required to obtain design air flow.
8. Test and record fan motor horsepower, amperage, voltage, and RPM (rated and actual.)
9. Record fan motor manufacturer, model and serial numbers and service factor (actual.)
10. Record motor starter size (actual.)
11. Test and record diffuser, register and grille CFM (preliminary, design and actual) for supply, return and exhaust systems. If the return air quantities are not shown at the return grille locations on the contract documents, use the percentage method (supply air less the outside air equals the percentage of return air) and balance the return air grilles accordingly.
12. Test and record main duct traverse readings for all air handling units and fans (preliminary, design and actual.) This shall include exhaust, supply, return and outside air ducts.
13. Record each system supply air temperature, return air temperature mixed air temperature and outside air temperature (dry bulb and wet bulb) in heating and cooling modes.
14. Record air temperature and humidity in each room at time of air balance.
15. Record AHU type, location , manufacturer, model number, and serial number.
16. Mark all damper quadrants as to final adjusted position, and lock into place.

17. Check fan rotation on all fan units.
18. Check filters for cleanliness prior to balancing. Test only with new, clean filters of the type specified in place.
19. In cooperation with the control manufacturer's representatives, set and adjust all automatically operated dampers to operate as specified.
20. Record the date, time, outside temperature and outside humidity at the time of recording unit temperatures.

E. Architect and engineer reserve the right to require the contractor to demonstrate the uniformity of heating and cooling in each area of the building.

F. All equipment, fans, motors, etc., shall run at their required speeds and be free from excessive vibration and noise. No bearings, journals, or any part of the motors shall heat to a temperature in excess of 40°C above the temperature of the surrounding air.

G. All air balancing shall be ±10% of design flows.

2.06 EQUIPMENT START-UP

A. Before final payment, provide architect and engineer with letter from each equipment supplier stating that equipment has been started and checked by factory qualified field service technicians and is installed and running satisfactory in every respect.

PART 3 EXECUTION

3.01 TESTS

A. Test all piping, following installation, but before it is covered or connected to the equipment. Furnish necessary labor, materials and equipment for making test. All leaks disclosed by testing shall be reworked in an approved manner and the leaking system shall then be retested until proved tight under pressure. Test all systems for watertightness (or gas-tightness) as required by the authorities having jurisdiction, or in the absence of such requirements the minimum tests shall be made as follows:

1. All refrigerant piping systems shall be tested at 200 pounds with dry nitrogen until all leaks have been made tight. After the pressure tests use suitable vacuum pump to evacuate the system to at least 1000 microns, then charge the system with refrigerant and oil as required. Prior to running the refrigerant equipment all safety and operating devices and controls shall be properly adjusted and tested for proper operation and protection of the equipment.

B. Test all heating, cooling and ventilating equipment. When installation is complete, all equipment shall be tested for proper operation and functioning as directed by Architect.

1. All equipment, motors, fans, etc., shall run at their required speed and be free from excessive vibration and noise. No bearings, journals, or any part of the motors shall heat to a temperature in excess of 40°C. above the temperature of the surrounding air.
2. The equipment, diffusers, registers, dampers, etc., shall be adjusted to deliver air at all outlets according to the amount of air shown on the drawings or as required to obtain adequate room temperature.
3. Architect reserves the right to require the Contractor to demonstrate the uniformity of heating and cooling in each area of the building.

3.02 COORDINATION

A. The mechanical work shall be installed as neatly as possible in the locations shown but shall be subject to such deviations, modifications and relocations as may be necessary to conform to the requirements of the architectural drawings and as necessary to avoid interferences with the structural work and the work of other trades, and interferences between the various trades. This shall be done at no cost to the Owner. No ductwork or equipment shall be installed which would require ceilings to be lower than required by drawings, unless approval is obtained from the Architect.

B. It is the responsibility of the General Contractor to coordinate the work of his subcontractors. To this end, the General Contractor shall require that the various subcontractors carefully examine and familiarize themselves with the architectural and structural drawings and drawings covering the work of other trades, and that they frequently consult with all other trades so that the work may be coordinated.

C. If necessary to coordinate and expedite the work, the Contractor shall prepare "interference drawings" and submit them to the Architect for approval. Such drawings shall show the work of the various trades involved, illustrate proposed details of construction and arrangement of equipment and apparatus, and clearly indicate any deviations from contract requirements.

D. Minor changes in arrangement may be made to suit unforeseen conditions, but no major deviation shall be made without written approval from the Architect. If any deviations are deemed necessary, submit all details of proposed changes and all reasons therefore, in writing, to the Architect for approval prior to making installation of such work.

E. Do not fabricate ductwork and piping before interferences are verified. No extra will be allowed for piping or ductwork fabricated in advance which can not be used.

F. Field verify exact sizes of fire dampers and duct balancing dampers before ordering. No extra will be allowed for dampers ordered in advance which can not be used.

3.03 EXCAVATING AND BACKFILLING

A. Do all excavating and backfilling required for the installation of underground work required by the mechanical work.

B. Excavating and backfilling shall comply with all applicable provisions of Division 31, EARTHWORK, including the provisions therein concerning classification of excavated material.

C. Copper piping and PVC piping, shall be laid on a 6" bed of sand and backfilled with 12" of sand in 6" layers to 12" above top of pipe in areas not below slab or pavement. Complete backfilling with Tennessee Highway Class "B" aggregate to slab under building and outside of building to underside of pavement. The balance of the fill outside the building shall be clean earth thoroughly tamped and crowned to allow for subsequent settlement. Compact to 100% density under buildings and paved areas.

D. All trenches shall be braced as required to protect workmen and adjacent work. Comply with local regulations or, in absence thereof, with provisions of the "Manual of Accident Prevention in Construction", of the AGC.

3.04 CUTTING AND REPAIRING

A. All chases, recesses, sleeves and other openings in masonry and concrete shall be built in as the construction work progresses, and it shall be the responsibility of the subcontractor to see that such chases, recesses, sleeves and other openings required for their work are properly located and installed. If this is not done by the subcontractor whose work required such accommodation, it shall be performed at his expense.

B. Structural members or finished work shall not be cut without the express permission of the Architect. Cutting shall be done neatly and patching or repairing shall match adjacent work.

3.05 PROTECTION AND CLEANING

A. Work shall be protected at all times. Pipe openings shall be closed with caps or plugs until permanent connections are made. Equipment shall be covered, if necessary, to protect against dirt, water, chemical or mechanical damage or defacement. The installation of fixtures liable to damage shall be deferred by the Architect. Cover all machine openings and open ends of ductwork to prevent entry of dirt and debris as project construction progresses.

B. Upon completion of the work and after all tests have been made and piping systems proven tight, clean all equipment, dirt pockets, water tanks, circulating systems, filters, etc., and leave in correct operating condition. No air unit shall be operated without filters.

3.06 PAINTING

A. Painting of mechanical equipment, piping, and exposed ductwork in finished spaces, or exposed on the exterior, shall be finished as specified under Section 099100, PAINTING. All equipment exposed on the exterior furnished without factory finish shall be painted.

B. Equipment with a factory applied finish shall have scratches, chips, etc., primed and touched up with materials which will protect the surface and match the adjacent area.

3.07 OPERATING INSTRUCTIONS

A. Furnish the services of competent personnel to instruct the Owner's personnel in the proper operation and maintenance of all equipment, for a period of not less than 3 working days. All owner training sessions shall be video taped and at the completion of training a DVD format copy of the video shall be given to the owner with all installation, operation, and maintenance manuals.

B. Furnish and deliver to the Owner three sets of operating instructions for all equipment installed under this contract, including shop drawings, piping diagrams, wiring diagrams, maintenance recommendations and information concerning replacement parts. This information must contain mechanical and plumbing contractor names, equipment supplier names, contact personnel, telephone numbers, and facsimile telephone numbers. This information shall be contained in a three ring binder of suitable size, and labeled on the exterior with project name.

3.08 QUIETNESS OF OPERATION

A. All fans, motors and other apparatus shall be selected and installed for reasonably quiet operation. Any objectionable noise which develops shall be corrected before the work will be accepted. Equipment or duct connections and fittings which produces objectionable noise shall be adjusted or insulated so as to eliminate the noise, or shall be removed and replaced by satisfactory equipment. Provide spring or rubber machine mounting isolators and flexible piping and duct connections where necessary to prevent transmission of vibration to building structure or to piping and duct system.

3.09 GUARANTEE

A. The Contractor shall guarantee all work to be in accordance with contract requirements and free from defective or inferior materials, equipment, and workmanship for a period of one year, and he shall guarantee that all equipment is of proper size and design and so installed as to produce the capacities and results specified and shown on the drawings. Compressors shall have an extended 4 year warranty.

3.10 SUBSTITUTIONS

A. Substitutions shall be allowed in accordance with Division 1. Substitution approval shall be at the sole discretion of the Engineer.

B. Contractor shall note on shop drawings all major differences from specified material or equipment.

C. The contractor shall be responsible to verify that all dimensions, weights, and electrical requirement of substituted materials and equipment meet project requirements.

D. All requests for substitution must be submitted to the architect and engineer a minimum of 14 calendar days prior to project bid date. Such submission does not constitute approval. Only items or manufacturers specifically stated in the project specifications, drawings or addenda for use shall be considered as approved.

END OF SECTION

SECTION 23 05 10

BASIC MATERIALS AND METHODS - HVAC

PART 1 GENERAL

1.01 WORK INCLUDED

A. General provisions of Division 23, General and Supplementary Conditions, and General Requirements of Division 1, apply to this section.

1.02 BASIC REQUIREMENTS

A. Equipment and materials used in the work shall be in accordance with the contract documents, of the best quality and grade for use intended, shall be new and unused and shall be the manufacturer's latest standard or current model for which replacement parts are readily available.

B. Work shall be installed under the constant supervision of a competent superintendent and by skilled and competent mechanics experienced in the trade that contractor is practicing.

C. All apparatus and equipment shall be installed and connected in accordance with the best engineering practices and in accordance with the manufacturer's recommendations. All auxiliary piping, valves, electrical connections, etc., recommended by the manufacturer or required for proper operation shall be furnished and installed complete.

D. The work of this section is subject to the requirements of the Mechanical General Provisions and the General Requirements in Division 1.

PART 2 PRODUCTS

2.01 SLEEVES AND PLATES

A. All pipes that pass through masonry partitions and walls and concrete floor slabs shall be installed with standard weight galvanized steel sleeves. Sleeves through floors shall be long enough to project a minimum of 2" above finished floor. Sleeves shall be large enough for pipe, pipe insulation and required fire caulking. Sleeves in concrete shall be accurately located in the forms and secured in place to prevent displacement during pouring of concrete. Sleeves below grade in exterior walls shall be Link-Seal with wall penetration seal or approved substitution.

B. Sleeves in finished spaces shall finish flush with the finished wall surface. Sleeves for insulated water or refrigerant pipe shall be large enough to accommodate the insulation.

C. Pipes passing through masonry walls and partitions in finished spaces shall be fitted with metal escutcheons or collar plates. Plates occurring in painted walls or ceiling shall be prime coated for painting; other plates shall be chromium plated.

D. Exposed ducts passing through finished walls shall be furnished with sheet metal escutcheons.

E. All pipe penetrations of fire rated floors or walls are to be protected. Space between metal pipe and wall or sleeve shall be protected with Hilti Fire Barrier Penetration Sealing System or approved substitute. Installation shall be in accordance with the manufacturers recommendations for the hourly fire rating of the partition. The system shall be U.L. listed. For insulated chilled water, domestic cold water and refrigerant pipe, continue insulation and vapor barrier through wall. The sleeve through the wall shall be large enough for the pipe, insulation and fire caulking.

F. PVC pipe passing through rated walls, ceilings or floors shall have Hilti UL Listed Fire Protection System or approved substitute. System number shall be as required by construction and rating.

2.02 ACCESS PANELS

A. Furnish steel access panels, not smaller than 12" for single valve and 12" X 24" or 18" X 18" for two or more valves, for access of concealed valves, unions, dampers, etc., where no other means of access is shown or specified. Access panels shall be turned over to the general contractor for installation.

B. Panels shall be Milcor, or approved substitute, with screw driver operated cam latch, and of proper design and style for installation in wall, floor or ceiling construction called for on architectural drawings. Access panels in fire rated construction shall have a UL label Class B rating. All panel styles to be verified by the Designer.

2.03 MOTORS

A. Motors shall be in accordance with AIEE, UL, and NEMA standards selected for quiet operation, of standard design for specific voltage available, and for continuous duty 40°C. rise. Unless otherwise specified, they shall be open drip proof, ball bearing, squirrel cage type, equal to Louis Allis, Westinghouse, G. E., or approved substitute. Provide raceway terminal box on each motor, of ample size and with removable cover for connections.

B. Motors up to and including l/2 HP shall be designed for 120 volts, single-phase current; motors 3/4 HP and larger shall be designed for 3-phase current. Voltage will be as called for on the drawings. Verify characteristics of available current at the building before equipment is ordered. Verify with electric drawings.

C. Horsepower for all motors shall be such that when drive apparatus is operated at full capacity, motor shall be under not less than 3/4 load nor more than full rating.

D. Each motor shall have a permanent name plate, showing name of manufacturer model and serial numbers, amperes per phase, horsepower, voltage, speed and cycles.

E. Provide for each belt drive motor a guard shielding perimeter and face of the drive.

2.04 MOTOR CONTROLS

A. All motors shall be furnished with starters under Division 23.

B. Manual starters with overload protection shall be used to control motors 1/2 HP and smaller. Single phase motors requiring interlock and all 3-phase motors shall be provided with magnetic starters.

C. Magnetic starters shall have thermal overload and low voltage protection. Three phase starters shall have (3) thermal overloads. Also, provide ground fault protection. All electrical and mechanical components shall be of the highest quality, and parts subject to wear or deterioration shall be renewable. Starters for motors 3/4 HP and larger shall be combination fused type and incorporate type L.P.S. fuses. Holding coils shall suit the requirements of control diagrams. Provide control voltage transformers in starters as indicated on control diagrams. Starters to be UL listed.

PART 3 EXECUTION

3.01 GENERAL

A. Run exposed ducts and piping parallel to the principal parts of the building. Ducts and piping shall be run concealed when provisions are made in floors, walls, ceilings and chases through all finished spaces, except where specifically noted otherwise.

B. Piping, ducts, and equipment shall be kept as close as possible to ceilings, walls, columns, etc., and shall be installed in such an orderly manner as to take up a minimum of space and allow a maximum of headroom, and all offsets, fittings, etc., required to accomplish this shall be furnished and installed, whether or not each offset and fitting is specifically shown or noted. Minimum clearances on exposed piping shall be maintained as specified under "Piping Clearances" herein.

END OF SECTION

SECTION 23 05 29

SUPPORTS AND ANCHORS - HVAC

PART 1 GENERAL

1.01 WORK DESCRIPTION

A. Provide all labor, equipment, materials, etc. required to complete installation as specified herein and/or shown or scheduled on the drawings.

B. Support (1) from wood using coach screws on open construction and hanger flanges on sheeting, (2) from concrete using inserts, (3) from steel using beam clamps, rivets or bolts, (4) from concrete blocks using toggle or through bolts. Fasten supports to building in following order of preference: (1) steel framing, (2) concrete, (3) wood framing, (4) masonry, (5) wood sheathing. Do not support from roof deck without approval. Do not use plastic wall anchors. All hangers, rods, and inserts shall be Underwriters Laboratories approved for the service intended and shall meet MSS #SP-58 & 69.

C. Adhesives are not acceptable as mounting or supporting devices.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. General Provisions, Section 230500.

B. Basic Materials and Methods, Section 230510.

PART 2 PRODUCTS

2.01 HANGERS

A. Use adjustable swivel ring band type for pipe 2½" and smaller, except C.I.. For pipe 3" and larger, unless otherwise noted, use adjustable steel, clevis type.

B. At each hanger on insulated pipe provide (1) pipe covering protection saddles on hot lines and (2) insulation shields on cold lines.

C. Saddles to be 16 gauge, minimum 12° saddles arc with the following minimum saddle lengths:

Pipe Size	Minimum Saddle Length
1	12"
2	12"
3	12"
4	12"
6	12"
8 & Greater	12"

D. Hanger surface material shall be such that there will be no possibility of electrolytic corrosion between hanger and pipe.

E. Anchors requiring explosive charges shall not be used. Phillips "Red-head" shields can be used for loads under 300 lbs.

2.02 BASES

A. On motor-driven equipment, where motor is not directly mounted on driven equipment, provide a structural steel base, reinforced to prevent flexure, which shall support both the equipment and the motor.

B. Provide bolts, inserts, pipe stands, brackets and accessories to distribute loads over building structure.

2.03 SLIDE BEARINGS

A. Slide bearings shall consist of 2 elements each made of 3/32" thick, 100% virgin tetrafluorethylene polymer and reinforcing aggregates prebonded to a steel backing. Principal aggregates material shall be ground glass fibers. Bonding material shall be heat-cured, high temperature epoxy capable of -320°F to +500°F temperatures. The coefficient of static friction of material to itself shall not exceed 0.902".

PART 3 EXECUTION

3.01 HORIZONTAL PIPING SUPPORT SCHEDULE

Pipe Size	Rod Dia.	Steel	Copper	PVC
		Max. Spac.	Max. Spac.	Max. Spac.
1) up to ½"	¼"	6ft.	4ft.	3½ ft.
2) 3/4" to 1"	3/8"	7ft.	5ft.	4ft.
3) 1¼"	3/8"	7ft.	7ft.	5ft.
4) 1½"	3/8"	8ft.	8ft.	5ft.
5) 2"	3/8"	10ft.	8ft.	5ft.
6) 2½"	½"	11ft.	9ft.	6ft.

3.02 METHOD

A. Provide hanger within 18" of each elbow, also provide hanger within 18" of connection to each piece of equipment.

B. Support vertical pipe at base and at each floor. In addition, 1" or smaller copper pipe shall be supported at 5 foot intervals.

C. Glass pipe hangers shall be padded.

D. Pipes passing thru walls shall not bear on building construction.

E. Where pipes carry material colder than 90°F, except domestic cold water, hangers shall be sized to fit outside diameter of insulation. Provide shields at each hanger. On 2½" and larger pipe, insulated with fiberglass, provide calcium silicate insulation at hangers.

F. All floor-mounted equipment shall be mounted on a reinforced concrete base covering the complete floor area of equipment. This concrete base shall be 4" high and shall extend 3" beyond the equipment on all sides. Provide all necessary anchor bolts and templates. Provide ¼" thick layer of non-shrinking grout between floor-mounted machinery and concrete pad. Where equipment mounts on structural steel, provide shims.

G. Any piece of equipment installed in a finished ceiling, or wall area, shall be supported independently of the building finish. Ceiling-mounted items shall be supported directly from the building structure except, with Engineer's written approval, can be from ceiling suspension system if the hanger load is less than 10 lbs.

H. Suspended equipment shall be supported from building structure by adjustable rods.

END OF SECTION

SECTION 23 07 00

INSULATION - HVAC

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. General provisions of the Contract, General and Supplementary Conditions, and General Requirements, apply to this section.

1.02 WORK INCLUDED

A. Work required under this section consists of insulation for piping and duct systems and equipment as hereinafter specified.

B. The work of this section is subject to the requirements of the Mechanical General Provisions and Basic Material Specifications.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Refrigerant Piping, Section 232300

B. Air Distribution, Section 233000

1.04 BASIC REQUIREMENTS

A. All materials used for insulation of pipe and ducts and equipment covered in this section shall be UL listed. Fire hazard ratings shall be as follows:

1. Flame spread of 25, and smoke development of 50 for all duct insulation and other insulation located in ceiling plenums or rooms utilized for return air plenums.

2. Flame spread of 25 and smoke development of 200 for other pipe and equipment insulation.

B. Increase the insulation thickness of ½" on all piping outside the building insulation envelope and weatherproof with 0.016" thick aluminum jacket with aluminum fitting covers. This piping shall be protected with electric heat tape installed under the insulation.

C. All insulation and thicknesses are selected to meet the 2006 International Energy Conservation Code.

D. Install 0.016" thick aluminum jacket on all pipe insulation in mechanical rooms 7'-0" from finished floor.

PART 2 PRODUCTS

2.01 FLEXIBLE TUBULAR ELASTOMERIC

A. Provide fire-retardant closed-cell slip-on flexible type. Product must be guaranteed by manufacturer to have continuous operational temperature limit of not less than 180°F and a minimum "R" value of 3.57 at 75°F 50% RH. Provide insulation for the following:

1. Refrigerant suction and hot gas bypass lines - ½" thick on lines 1" or less - 1" thick on lines larger than 1". Install a 0.016" thick aluminum jacket on insulation outside the building.

2.02 FIBERGLASS BLANKET FOR DUCTS

A. Provide 2" thick 3/4" lb. density fiberglass blanket insulation with FSK or FRK jacket installed “R” value of 5.6. Install according to manufacturer's recommendations. For ducts 30" wide and over support insulation on bottom of duct with rows of welded insulpins on 18" center. Lap jacket 2" at seams and vapor seal. Provide this insulation for the following:

1. All supply air ducts. Supply ducts exposed in conditioned spaces do not require external insulation.
2. Outside air ducts.
3. Top of supply air diffusers.
4. Return air ducts installed below building insulation shall not be insulated unless noted otherwise.
5. Relief air ducts and grilles.
6. Supply and return duct insulation in attic spaces above roof insulation shall be 3"- 3/4# density with installer “R” value of 8.3.

PART 3 EXECUTION

3.01 GENERAL

A. Install all insulation products in strict accordance with manufacturer's instructions.

B. All items requiring service such as strainers, balancing valves, etc., provide removable insulation caps of insulation equal in thickness to pipe covering.

C. Cover all joint, rips, tears, punctures, staples, insulpins or breaks in vapor barrier jacket with 4" wide woven glass fabric tape embedded in vapor barrier fire resistant mastic.

D. No insulation shall be cut where a hanger is located.

E. Flexible tubular elastomeric piping installation shall be as follows:

1. Install pipe insulation by slitting tubular sections and applying onto piping or tubing. Alternately, whenever possible, slide unslit sections over the open ends of piping or tubing. All seams and butt joints shall be adhered and sealed using Armstrong 520 Adhesive. When using AP Armaflex SS only the butt joints shall be adhered using 520 Adhesive.
2. Insulation shall be pushed on the pipe, never pulled. Stretching of insulation may result in open seams and joints.
3. All edges shall be clean cut. Rough or jagged edges of the insulation shall not be permitted. Proper tools such as sharp knives must be used.
4. On cold piping, insulation shall be adhered directly to the piping at the high end of the run using a one inch strip of 520 Adhesive on the ID of the insulation and on the pipe. All exposed end cuts of the insulation shall be coated with 520 Adhesive.
5. Sheet insulation shall be used on all pipes larger than 6" IPS. Insulation shall not be stretched around the pipe. On pipes larger than 12" IPS, adhere insulation directly to the pipe on the lower 1/3 of the pipe.
6. Seams shall be staggered when applying multiple layers of insulation.

7. All fittings shall be insulated with the same insulation thickness as the adjacent piping. All seams and mitered joints shall be adhered with 520 Adhesive. Screwed fittings shall be sleeved and adhered with a minimum one inch overlap onto the adjacent insulation.
8. Valves, flanges, strainers and Victaulic couplings shall be insulated using Armaflex donuts that shall then be covered with sheet or oversized tubular insulation.

END OF SECTION

SECTION 23 23 00

REFRIGERANT PIPING

PART 1 GENERAL

1.01 WORK INCLUDED

A. The work required under this section of the specification include all work necessary for the complete installation of a refrigerant piping system.

B. The work of this section is subject to the requirements of the Mechanical General Provisions and Basic Materials Specifications.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Ductless Split System Units, Section 238126.

PART 2 PRODUCTS

2.01 REFRIGERANT PIPING SYSTEM

A. The refrigerant piping shall be Type L copper with wrought copper fittings and high temperature solder joints, silfos, or approved substitute. The piping system shall include but not be limited to the following: liquid line solenoid valves, hot gas bypass and control where noted, charging valves sight glass with moisture indicator, liquid line strainer drier, flexible connectors where required. The piping shall be installed according to the diagrams furnished by the manufacturer's Engineer for approval prior to installation. The piping system shall be tested at 200 pounds with dry nitrogen until all leaks have been made tight. After the pressure test use suitable vacuum pump to evacuate the system to a least 1000 microns, then charge the system with refrigerant, all safety and operating devices and controls shall be properly adjusted and tested for proper operation and protection of the equipment.

PART 3 EXECUTION

3.01 Route all refrigerant piping between condensing units and evaporator coils by the most direct route possible in order to minimize refrigerant line length.

3.02 All refrigerant piping must be supported from the building structure and affixed to the structures.

3.03 Reasonable measures should be taken to insure that the installed refrigerant piping forms no traps for the system lubricating oil.

3.04 Refrigerant piping extending through the roof shall be sleeved, water proofed and flashed watertight.

3.05 Refrigerant piping underground shall be run in PVC piping sleeve. Seal openings between PVC sleeve. Seal openings between PVC sleeve and refrigerant piping with foam to form a weatherproof seal.

3.06 All refrigerant suction and hot gas lines shall be insulated with flexible tubular elastomeric insulation as required in section 230700 hereinbefore.

END OF SECTION

SECTION 23 30 00

AIR DISTRIBUTION

PART 1 GENERAL

1.01 WORK INCLUDED

A. The work required under this section includes all work necessary for the complete installation of an air distribution system.

B. The work of this section is subject to the requirements of the Mechanical General Provisions and Basic Materials specifications.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Basic Materials and Methods, Section 230510.

B. Insulation, Section 230700.

1.03 CERTIFIED RATINGS

A. All fans shall have AMCA certified ratings and be UL listed.

PART 2 PRODUCTS

2.01 FANS

A. Ceiling fans shall be direct drive centrifugal type with grille, insulated housing, wall switch, backdraft damper, and discharge duct to roof with roof jack.

2.02 DUCTWORK

A. Type:

1. All ductwork shall be sheet metal unless noted otherwise (26 ga. minimum.)
2. Ductwork type as follows:
    a. Supply return and outside air duct on constant volume system to be low pressure.
    b. Exhaust duct to be low pressure.

B. Low Pressure Sheet Metal Ductwork:

1. Sheet metal work, unless noted otherwise, shall be fabricated of Armco Zincgrip-Paintgrip galvanized steel where exposed to weather or to be painted. Sheet metal for concealed ductwork shall be fabricated of galvanized steel, and be "Bethcon", as manufactured by Bethlehem Steel Company, or "Softite", as manufactured by Wheeling or approved substitute.
2. Ducts shall be sizes shown on the drawings, crossbroken, rigidly braced, adequately supported and securely fastened in place. Fabricate and install ducts in accordance with latest SMACNA Duct manual details.
3. Stainless steel shall be used for the food service hoods and ducts. Use Type 304 for food service areas.
4. Duct connections 24" wide and larger to be made using the "Ductmate System" or approved substitute. The installation to be complete using angles, corners, cleats, gaskets, sealer, and bolts. Install according to Manufacturers instructions.

C. Leakage Testing of Installed System Acceptance Criteria:

1. The installed duct system shall be tested to the designed operating pressure. This includes supply, return, and exhaust duct.
2. The air leakage at the test pressure shall be measured by a calibrated orifice type of flow meter. Total allowable leakage of the system shall not exceed 2 % of the air handling design capacity of the system.
3. Leakage concentrated at one point may result in objectionable noise even if the system passes the leakage rate criteria. This noise source must be corrected to the satisfaction of the engineer.

D. Joint Sealing:

1. All joints shall be sealed with an approved duct sealer specifically formulated for sealing the field joints in duct systems. Sealer for low pressure duct systems (<2"w.g.) Shall be Ductmate Proseal or Foster 32-17 water based sealants.
2. Flanged joints shall be sealed by neoprene rubber gaskets.

2.03 DUCT ACCESSORIES

A. Fire Dampers - All fire dampers shall be Type B, constructed and tested for compliance with the latest edition of UL Standard 555. All dampers shall bear the UL label. Each damper shall be suitable for use in either the horizontal or vertical position and must include an integral drive spring. Sleeves and collars shall be furnished with fire dampers. Dampers shall be designed so as not to restrict air flow. A suitable access door in duct shall be provided for resetting all fire dampers. Install all dampers in accordance with all manufacturer installation instructions.

B. Louvers - Louvers in outside walls shall be high performance, drainable blade weather louvers. Louver to have extruded aluminum construction with anodized finish, color by Architect and 4" frame thickness. Adjustable louvers to have vinyl blade gasket. Louvers to have 0.15" wg., pressure drop maximum at 900 fpm velocity through free area and no water carryover at designed air flow. All louvers to have aluminum bird screen and exterior frame. All louvers are stationary type unless noted on drawings, and shall have AMCA seal.

C. Combination Fire/Smoke Dampers - All combination fire/smoke dampers shall be constructed and tested for compliance with the latest editions of UL Standard 555 and 555S. All dampers shall bear the UL label. The 120 volt (or 24 volt - designer specify) electric (or pneumatic - designer specify) damper shall be rated to 350E Fahrenheit, with blade seals of silicone rubber capable of withstanding 450E Fahrenheit. Additionally, the damper must be factory supplied with an actuator and sleeve to comply with the requirements of UL 555 and UL 555S. Install all dampers in accordance with all manufacturer installation instructions. Provide a suitable access door in duct for resetting of damper.

D. Brick Vents:

1. Brick vents in exterior walls shall be fabricated of extruded aluminum, 4" deep, with 45Eblades. Frame and blades shall be 0.125" thick. Brick vent color shall be as selected by the architect.

E. Manual Balancing Dampers:

1. Manual balancing dampers in rectangular ducts shall be American Warming. Dampers in duct runs and branches shall be Model VC-21. Dampers to be constructed of 16 ga galvanized steel, with vinyl seals for low leakage at shutoff. All dampers to be caulked with silicone between damper and duct, and have external adjustment marked Open-Closed. Dampers shall be furnished with controls when motor operated. Dampers to be opposed blade type if either side is 12" or larger. Dampers under 12" may be single blade type.
2. Manual Balancing Dampers in round ducts shall be American Warming Model VC-22 in sizes up to and including 10" and Model VC-23 in sizes 12" and larger. Dampers to be 16 ga galvanized steel. Provide EPT sponge seals for low leakage.
3. Dampers to have 1% leakage rate at 1" wg duct pressure in accordance with AMCA 500.
4. All dampers to be installed with 2" standoff bracket.

F. Flexible Duct:

1. Flexible connections from main to terminal supply diffusers may be used above accessible ceiling areas.
2. Flexible duct shall be UL listed Class 1 air duct connector and be Flexmaster type 4M or approved substitute, with 1-1/2", 3/4 pound density glass fiber with flame resistant vapor barrier, R=6.0. Maximum lengths not to exceed 6 feet. Provide air tight inner liner, wire helix, and reinforced metalized outer jacket.
3. Use adjustable steel strap clamps or flexible nylon wire ties when attaching flexible duct to sheet metal collars. Wrap duct and collar with 2" wide duct tape before attaching clamp.
4. System to be UL 181, SBCC, BOCA, NFPA 90A & 90E, and HUD approved.
5. Do not use flexible duct in return or exhaust systems.

G. Grilles, Registers, and Ceiling Outlets:

1. All flat grilles and registers shall be as scheduled on drawings, or approved substitute, as scheduled on the drawings, with baked enamel finish; color as selected by Architect.
2. Coordinate location with reflected ceiling plans.
3. Provide square to round adaptors if required.
4. All outlets and inlets to have sealing gaskets and volume control dampers. Provide frame suitable for wall or ceiling installation used. Verify with Architectural drawings.
5. Diffusers in UL ceilings to be steel with radiation damper and insulation blanket.

H. Flexible Connectors:

1. Provide flexible connectors between each air unit or fan and the duct distribution, on both the supply side and the return side.
2. Connectors shall not exceed 10 inches in lengths.

3. Connectors to be of an approved flame retardant fabric with a maximum flame spread of (25) and a maximum smoke development rating of (50).
4. All connectors on supply duct to be insulated.

I. Branch Connections:

1. Main Supply Branch: (See SMACNA Manual Figure 2-7, 2-8) use unvaned radius transition elbow with splitter damper when branch width is 36" or smaller, and vaned square throat transition elbow when branch width is larger than 36".
2. Sub-Branch Supply: (See SMACNA Manual Figure 2-16) use straight tap with extractor, having manual control rod extended thru main branch side, when extractor weight is 50 lbs or less. For sub-branch sizes where extractor would be heavier than 50 lbs, use 45° or radius entry clinch lock collar. (See SMACNA Figure 2-8, and manual balancing dampers.)
3. Sub-Branch Return: (See SMACNA Manual Figure 2-8) use 45° or radius entry clinch lock collar. (Provide each with manual balancing damper.)
4. Round Supply Take-Offs: Use factory fabricated rectangular to round type galvanized steel fittings and 26 ga manual balancing damper with 2 wing nuts and handle. System to be Crown Model 3300-DS or approved substitute. Provide 2" stand off bracket.
5. Round Return/Exhaust Tap-ins: Use factory fabricated beaded straight spin-in type galvanized steel tap fittings.
6. For low pressure return and/or exhaust application of duct connectors to square ceiling mounted grilles or registers, use factory fabricated square-to-round galvanized steel minimum 3" deep adapter boxes having 2" long beaded round collar.

J. Vanes and Deflectors:

1. Vanes and deflectors to be galvanized steel sheet same thickness as used in ductwork of corresponding size. Vanes to be securely anchored to duct or casing and have freestanding edges braced as necessary for making rigid.

K. Transitions:

1. Increase-in-area transition: Transformation slope not to exceed 20°.
2. Decrease-in-area transition: Transition slope to be maximum 30°, but 20° is preferable.
3. Angle of transformation at connections to heaters or other equipment not to exceed 30° on approaching side of equipment and 45° on leaving side. Angle of approach may be increased to meet space conditions when transformation section is provided with vanes.

L. Elbows:

1. Elbows shall be either full radius type or square throat with turning vanes. No mitred elbows allowed. Short radius elbows with vanes also allowed.
2. Unvaned full radius elbow, shall have throat radius equal to width of duct and full heel radius over than 36" in width.

3. All square heel elbows shall have 3" square throat elbow with large class single thickness vanes thru 36" unsupported vane length and large double thickness vanes for unsupported vane length of 37" thru 72" as per SMACNA Manual Figures 2-3 and 2-4.

2.04 AIR FILTERING EQUIPMENT

A. All air units, and package terminal units shall be provided with air filters. Filters shall be installed in the return air upstream from any heat exchanger or coil, in an approved convenient location and shall be easily accessible for removing to clean or replace. 1" thick filters to have UL Class 2 rating, 2" and above to have UL Class 1 rating.

B. Air filters shall be of the types specified below. Type of filter required in each case, arrangements, sizes, capacities number of cells, and other requirements not specified hereinafter shall be as indicated on the drawings or as recommended by the unit manufacturer.

C. Split System Air Unit Filters shall be Farr Cam Farr 20-20, 1" thick pleated disposable type. Each filter to have a non-woven cotton and synthetic fabric media, media support grid and enclosing frame. The filter to be UL listed Class 2. The filter to have 20% efficiency by ASHRAE Test 52-76. Initial air resistance to be 0.09" WG at 250 FPM.

D. Media Fill: Provide filter media as follows:

1. Initial fill for each filter of each type installed for testing and adjusting AC system, and left in place for Owner's immediate use.

2. One complete spare fill for each filter of each type for Owner's future use. Store all spare media on premise in factory sealed containers, and obtain signed receipt therefore from Owner's authorized representative.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install Air Distribution Equipment as specified above and as recommended by manufacturer.

B. Sheet metal ducts shall be securely supported, hung or suspended by metal trapeze hangers or straps having a minimum width of one inch. Nails or screws shall not be driven through the duct walls.

C. All duct joints and seams shall be securely fastened and sealed to make air tight. All leaks shall be sealed with Hardcast.

D. All exposed openings in fan housing shall be protected with screens or gratings. All fans shall have belt guards on exposed drives.

E. Flexible duct connectors shall not pass through a fire wall or a partition having a fire resistance rating of (1) hour or more.

F. Do not install flexible ducts that have more than a 90° turn.

G. Contractor to verify duct sizes and fittings required with actual field measurements before fabrication of ductwork. The contractor shall not receive compensation for ductwork fabricated that cannot be used. See section 3.02.

3.02 EXCESSIVE NOISE AND VIBRATION

A. All air distribution equipment was selected for a noise level recommended for the space it serves. Any equipment causing excess noise or vibration will be replaced at the Contractor's expense.

END OF SECTION

SECTION 23 81 13

PACKAGE THRU WALL A/C UNITS

PART 1 GENERAL

1.01 WORK INCLUDED

A. The work required under this section includes all work necessary for the complete installation of package thru wall a/c units.

B. The work of this section is subject to the requirements of the Mechanical General Provisions and Basic Material Specifications.

PART 2 PRODUCTS

2.01 GENERAL

A. Furnish and install a package thru wall heating and cooling unit where shown on plans. The unit shall be complete with heavy welded steel chassis, bottom return, front return will not be accepted, extruded aluminum pencil-proof outlet grilles, aluminum centrifugal blower, PSC motor, permanent air filter, removable front panel, outside air motor damper, cooling coil, electric heating coil compressor, 4" subbase with factory receptacle. Unit to have fused disconnect on 208V models and short cord and plug for 265V modules and interior wall trim flange. Provide 18 gauge galvanized sheet metal wall sleeve with factory powder paint finish. Unit to be UL approved and be provided with a 5 year compressor warranty.

2.02 CONTROLS

A. Provide a built-in heating-cooling thermostat with ON-OFF switch and manual changeover capability. Where shown, provide a wall mounted 24v heat-cool thermostat with auto changeover and a fan on-off-auto switch.

2.03 WALL GRILLE

A. Provide louvered type aluminum outside air grille with wall trim flange. Provide factory color finish. Color shall be as selected by the architect.

2.04 The units shall be capable of condensate removal by use of condenser fan. An exterior drain is not required. (Straight electric units only - heat pumps require drains.)

PART 3 EXECUTION

3.01 Install unit according to manufacturers recommendations. Caulk around back of unit next to wall. Provide wall lintel. Do not rest wall on unit chassis.

3.02 Do not slope unit or wall sleeve back to room.

END OF SECTION

SECTION 23 81 26

SPLIT SYSTEM HEAT PUMP SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

A. The work required under this section includes all work and materials required to install a Split-System Heat Pump.

B. The work is subject to the requirements of the Mechanical General Provisions.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. General Provisions, Section 230500.

B. Basic Materials & Methods, Section 230510.

C. Refrigerant Piping, Section 232300.

D. Air Distribution, Section 233000.

1.03 QUALITY ASSURANCE

A. Perform work of this section using skilled workers who are trained and experienced in the required crafts and who are knowledgeable and familiar with the specified requirements and the methods to be used for proper performance of the work.

PART 2 PRODUCTS

2.01 SPLIT SYSTEM HEAT PUMP (INDOOR UNIT)

A. The integral fan section shall consist of a belt-driven, centrifugal type blower mounted on a rigid steel frame secured to the blower housing by rubber mounts. Blower wheels shall be statically and dynamically balanced. Wheels shall be carried on rubber enclosed, self-aligning, solid bronze grooved, graphite filled bearings provided with grease cups for lubrication. Motor mount design shall permit both belt adjustment and pulley alignment.

B. The cooling section shall consist of a DX coil, split face capacity mounted in a cabinet, matching the main blower cabinets. Refrigerant lines shall be factory piped to outside of the cabinet and the thermostatic expansion valve shall be factory installed. Condensate drain pan shall be 1-1/2" deep, coated on both sides with corrosion resistant material and shall have two 3/4" drain connections. Coil cabinet shall be factory insulated with foil covered insulation.

C. The heating section shall be electric of the specified size shown on the drawings. The electric heating element shall be low watt density, open-wire type element designed for single zone application. The heating bank shall be equipped with automatic and manual reset high temperature safety cut-outs, contactors, and divided into not more than 48 amp circuits with 60-amp fuses all pre-wired to the main control panel. The heating element shall be circuited to prevent electric heating operation during the cooling cycle. Internal heating and cooling power wiring shall terminate at a single junction in the unit panel.

D. Air Filters:

1. Provide each air handling unit with a 1" thick pleated disposable filter, Farr 20-20 or approved equal. The filters shall be UL Class 2, with 20% efficiency based on ASHRAE Test 52-76. Each filter shall have a non-woven cotton and synthetic fabric media, with media support grid and enclosing frame. Initial air resistance to be 0.09" WG at 250 FPM.

2. Provide an initial fill of filter media as described above installed for testing and adjusting of system, and left in place for Owner's immediate use. Additionally, provide one complete spare fill for each filter of each size for Owner's future use. Store all spare media on premises in original factory sealed containers, at a location as directed by the Owner's representative and obtain a signed and dated receipt for this spare media from the Owner's representative.

E. Provide a low-voltage, two-stage heating,one or two stage cooling thermostat with automatic changeover. Provide clear plastic locking cover. All unit wiring and controls shall be in accordance with NFPA requirements. All controls shall be furnished with the equipment as described under controls.

F. Each unit shall be suitable for air-to-air heat pump operation with a COP of not less than 2.8 at 47 degrees DB outside air, and a total unit cooling EER of 7.5 or greater when tested in accordance with ARI Standard 240. Each shall have an automatic defrost system, electric device to provide minimum of a 5 minute delay to prevent short cycling, emergency heat switch and indicator light to energize auxiliary heat if the compressor is inoperative due to a tripped safety device. Units shall bear UL and ARI labels. Units shall be covered by a 1-year warranty on all parts, including labor for replacement, plus an additional 4 year warranty on compressor.

G. A unit electrical disconnect shall be integral and furnished with the unit.

H. All units shall be of the same make and manufacturer.

I. Provide 1" Farr 20-20 filters.

2.02 OUTDOOR AIR-COOLED CONDENSING UNIT

A. Provide air to air electric heat pump condensing unit of cooling capacity noted on drawing and/or schedule.

B. Compressor unit(s) shall be welded, fully hermetic with crankcase heater(s) and vibration isolators. Units shall be designed to operate at +10 degrees F ambient on heating. Compressors shall have 5-year warranty.

C. Condenser fans and motors shall be direct drive fans with aluminum blades and zinc plated steel hubs. Motors with permanently lubricated ball bearings and built-in current and thermal overload protection. Vary condenser fan speed to provide low ambient cooling as called for on drawings.

D. Condenser coils shall be air-cooled condenser coil, aluminum fin secondary surface mechanically bonded to primary surface of seamless copper tubing. Sub-cooling circuit with liquid accumulator. Factory tested at 425 psig air pressure under water. Vacuum dehydrated at 175° F.

PART 3 EXECUTION

3.01 Install all units in strict accordance with manufacturer's installation and mounting instructions. Install units plumb and level, firmly anchored in locations indicated.

3.02 Provide the services of a manufacturer's authorized representative to supervise the mounting, installation, power, and control wiring (including required interlocks) of all units. Upon completion of all work, notify the engineer in writing that all units are operating properly, and are complete and satisfactory in all respects.

3.03 Verify prior to bidding that all units meet all electrical characteristics shown in the contract documents. This shall include voltage, phase, full load amps and overcurrent protection. Coordinate exact electrical requirements with electrical contractor prior to rough-in.

3.04 Provide full twelve month warranty for all parts and labor. Provide an extended four year warranty (parts only) for compressors.

3.05 Install full size type "M" copper condensate drain with 4" deep p-trap running to floor drain.

3.06 All units shall have an auxiliary drain pan with a float switch wired to shut units down on water rise.

3.07 FILTER MEDIA FILL

A. Provide initial filter media fill as described hereinbefore for each filter of each type installed for testing and adjusting AC system and left in place for Owner's immediate use.

B. Provide one complete fill and each filter of each type for Owner's future use. Store all media on premises in factory sealed containers, at a location as directed by the Owner's authorized representative. Obtain a signed receipt for these filters and include in project close-out documents.

END OF SECTION

SECTION 26 00 00

GENERAL ELECTRICAL

PART 1 GENERAL

1.01 OTHER CONDITIONS

A. Applicable provisions of the General conditions, Supplementary Conditions, and Division 1, General Requirements, apply to the Work under this Section.

1.02 SCOPE OF WORK

A. The work included under this specification consists of, but is not limited to, work as indicated on the drawings and hereinafter specified in Division 26. Without limiting the generality implied by the drawings and specifications, electrical consists of furnishing all materials, accessories, tools, and labor required and incidental thereto, to provide:
   1. Lighting fixtures and lamps.
   2. A complete system of conduit and conductors to supply electricity throughout the building addition.
   3. Panelboards, wiring devices, safety switches, transformers.
   4. Temporary wiring to be used during construction.
   5. Meter centers.
   6. Wiring in connection with heating, ventilating, plumbing, and air conditioning equipment.
   7. Emergency lighting.
   8. Voice, data, and cable TV wiring.
   9. CCTV system rough-in.
   10. Access control system rough-in.
   11. Fire alarm system.

1.03 RELATED WORK

A. Division 21: Fire Suppression, Division 22: Plumbing; Division 23: Mechanical; Division 27: Communications; Division 28: Electronic Safety and Security.

B. See drawings and other sections for equipment requiring electrical service.

C. Painting (except factory-applied finishes on equipment) is specified elsewhere.

1.04 REFERENCE STANDARDS

A. Make entire electrical installation in strict accordance with the requirements of all city, county, state, or federal codes of law having jurisdiction, the requirements and recommendations of the Board of Fire Underwriters, including all amendments and/or additions to said codes, laws, requirements, and recommendations and the requirements and recommendations of the Power Company. Applicable codes are as follows:
   1. 2006 NFPA 101 Life Safety Code.
   2. 2003 NFPA 72
   3. 2011 NFPA 70
   4. 2002 NFPA 90A
   5. 2005 NFPA 92A
   6. 2002 NFPA 13
   7. 2002 NFPA 13R

8. 2002 NFPA 13D
9. 2003 NFPA 14
10. 2006 International Building Code
11. 2006 International Fire Code
12. 2006 International Mechanical Code
13. 1999 NFPA 20

B. Should any work shown on the drawings or herein specified be construed a being contrary to or not conforming to the previously mentioned Codes, etc., bring it to the attention of the Architect before executing the work in conformity with the various codes, etc., without additional cost to the Owner, but not until the matter in question has been reviewed by the Architect.

C. Should any work shown on the drawings or herein specified be more rigid as to requirements than the requirements of the various codes, the drawings and specifications shall be used in executing the work.

D. File with proper authorities all necessary drawings as required by various codes, laws, ordinances, or other requirements.

E. Obtain and pay for all permits and for all required inspection certificates. Pay necessary fees.

1.05 WARRANTY-GUARANTEE

A. Warrant and guarantee that all work executed under this section of the specifications will be free from defects of materials and workmanship for a period of one year from the date of final acceptance of the building. The above parties further agree that they will, at their own expense, repair and replace all such defective work and all other work damaged thereby which defective during the term of the warranty-guarantee.

1.06 ARCHITECTURAL DRAWINGS

A. Refer to architectural drawings for details such as finishes, dimensions, materials, etc. Refer to drawings for door locations, door swings, partitions location, cabinet and counters, making proper allowances therefore. Refer to equipment plans for exact location of electrical connections which are dimensioned.

PART 2 PRODUCTS

2.01 SUBMITTALS

A. Manufacturer's Data: For information only, submit 6 copies of manufacturer's specifications, descriptions, illustrations, and installation instructions for each type of manufactured product to include: Lighting fixtures, lamps, exit signs, wiring devices, and switchgear intended for use on this project. The submittal shall consist of one or more brochures each containing only "one" copy of material describing the product. Several products may be included in each brochure.

B. Include manufacturer's certification as may be required to show compliance with these specifications. Indicate by transmittal form that a copy of each instruction has been distributed to the installer.

C. Furnish three complete sets of operating and maintenance instructions applying to equipment installed in conjunction with this contract; include parts lists, wiring diagrams, catalog data,

stamped approval submittal data, and operational checkout data as called for in these specifications, bound in hardback binders. Instructions shall be submitted to the Architect for approval at least one month in advance of initial system start-up.

2.02 MATERIALS

A. Materials shall not be ordered until architect's review of submittal material has been made. They shall be new and unused and the manufacturers standard product and the latest designs.

PART 3 EXECUTION

3.01 INSTALLATION

A. The electrical drawings which show the work included are diagrammatic only; the locations, routing, etc., of the various fixtures, items of equipment, wiring, etc., are approximate only. The entire installation is subject to such deviations, modifications, rerouting, etc., as may be necessary to meet the requirements of the architectural, structural, and other drawings; and also as necessary to obtain a proper coordination of the work with that of all other trades.

B. Carefully check and become familiar with the above-mentioned drawings, and frequently consult with all other trades so that the work may proceed as a harmonious whole.

C. Install concealed all wiring except where the Architect grants specified permission to run same exposed.

D. Installer shall defer the installation of all electrical fixtures liable to damage. After fixtures are permanently installed, completely protect against breaking, damage, or the depositing of any waste material therein until the system is accepted.

3.02 COORDINATION

A. Carefully check locations, layouts, and dimensions of all items to be installed under this section with the above-mentioned drawings, and coordinate with all trades affected.

B. Any work installed without properly checking and coordinating same as above provided, which as a result interferes with the proper installation of the work of other trades, is to be removed and properly reinstalled without additional cost to the owner.

C. It is the installer's responsibility to notify well in advance, all trades affected, or any chases, recesses, etc., which may be required for the installation of the electrical work. Should this be neglected, any cutting and/or patching required for such chases, recesses, etc., to be done at this contractor's expense.

D. Carefully examine all architectural, structural, plumbing, heating, electrical, and other drawings; and all other sections of the specifications for items, equipment, etc., not a part of the electrical contract which may require electrical connections. Unless explicitly indicated to the contrary, furnish and install all necessary electrical lines, boxes, etc., and make final connections to all such items, equipment, etc.

3.03 PROTECTION AND CLEANING

A. Protect work, fixtures, and materials at all times. Tightly cover and protect equipment against dirt, water, chemical, or mechanical injury. At final completion of all work to be thoroughly cleaned and delivered in a perfect unblemished condition.

B. Touch-up all damaged paint surfaces on equipment to match original paint.

3.04 TEMPORARY WIRING

A. As soon as practicable, install temporary wiring and lighting throughout the building addition. There shall be one pigtail lampholder for each 600 square feet of floor space or fraction thereof and in addition install a plug receptacle for each room having at least 200 square feet of space. There shall be one light in each room of 50 square feet or larger. Each pigtail outlet shall be equipped with a 100-watt lamp and replacement made immediately upon burnout or theft. Locate lights, as per above, on 25 feet center; install a temporary panelboard with not more than eight outlets, lights or receptacles on a circuit. Temporary wire shall consist of plastic type non-metallic sheathed cable having a ground wire to which all the receptacle ground poles shall be connected. Receptacles shall have "ground-fault" protection.

3.05 WORK IN CONNECTION WITH MOTORS

A. Check rotation and connect for proper rotation. Check overload heater element furnished with starters against nameplate rating or motor and code, call attention to improper sizes to mechanical contractor and architect. Connect all motors with short length of flexible conduit. Connect all pump motors with "UA" type flexible conduit as manufactured by American Brass Co. Use proper type connector with the type conduit. Connect all motors and controls completely, neatly, orderly, and properly tagged to proper operation of system involved. Motor connection not required unless specifically shown.

3.06 WORK IN CONNECTION WITH THE MECHANICAL AND PLUMBING EQUIPMENT

A. Furnish and install all conduit and wiring necessary for the line-voltage power supply (120-volts and above) of plumbing and heating, ventilating and air conditioning equipment. Furnish and install disconnect switches with the motors where required by the Code. Refer to the plumbing, heating, and air conditioning drawings and specifications. Control wiring for HVAC equipment shall be a part of Division 23.

3.07 SERVICE TO EQUIPMENT

A. Check service required by equipment prior to making final connections. Call differences to attention of Architect. Check equipment for proper protective devices and safety devices to allow proper operation of equipment and prevent burnout. Assist Owner in initial operation of equipment and make necessary adjustment for proper operation.

3.08 INITIAL OPERATION OF EQUIPMENT

A. Give all equipment furnished in the contract an operational test prior to final acceptance. Assist the Owner in the initial operation when the owner operates the building and equipment. Instruct the owner's personnel in the proper operation and maintenance of all the equipment furnished under this section of the specifications.

3.09 PROTECTION OF ROOF

A. Coordinate electrical work with roofing work in regard to any electrical items which may pierce or otherwise affect the roof. Hold consultation well in advance of the installation of the final roofing and allow sufficient time for the roofing work to be prepared for the electrical work.

B. Arrange for any cutting or repairing to roofing which might already be installed when an electrical installation is made. See roofing specification for roofing with relation to work of other trades piercing the roof. If necessary consultation is not held, any roof repairs necessitated by the electrical installation shall come under the scope of the work under this section.

3.10 FIRE-RATED WALL PENETRATIONS

A. Where conduit penetrates fire-rated walls, the space between the penetration item and the fire barrier wall shall be properly protected. The space adjoining the conduit penetration shall be filled with a material capable of maintaining the fire rating of the fire barrier, or it shall be protected by an approved device designed for this specific purpose. Where penetrating sleeves are used, the sleeves shall be solidly set in this fire barrier wall, and the space between the conduit and the sleeve shall be filled with a material capable of maintaining the fire resistance of the fire-rated wall.

END OF SECTION

SECTION 26 01 00

EQUIPMENT IDENTIFICATION

PART 1 GENERAL

1.01 DESCRIPTION

A. Provide identification for electrical equipment as set forth hereinafter.

PART 2 PRODUCTS

2.01 MATERIALS

A. Products shall be as set forth in other sections of specifications.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Furnish and install engraved, laminated phenolic nameplates for all safety switches, panelboards, transformers, switchboards, motor control centers, and other electrical equipment supplied for the project for identification of equipment, controlled, served, phase, voltage, etc. Nameplates shall be securely attached to equipment with self-tapping, stainless steel screws and shall identify equipment controlled, attached, etc. Letters shall be approximately ½" high, minimum. Embossed, self-adhesive plastic tape is not acceptable for marking equipment.

B. All empty conduit runs in conduit with conductors for future use shall be identified for use and shall indicate where they terminate. Identification shall be tags, string, or wire attached to conduit or outlet.

C. All outlet boxes, junction boxes, and pullboxes shall have their covers and exterior visible surfaces painted with colors painted to match the surface color scheme outlined above. This includes covers on boxes above lift-out and other type accessible ceilings.

END OF SECTION

SECTION 26 02 00
SUPPORTING DEVICES

PART 1 GENERAL

1.01 DESCRIPTION

A. Provide supports for raceway systems as described hereinafter.

PART 2 PRODUCTS

2.01 MATERIALS

A. Products shall be as set forth elsewhere in these specifications.

PART 3 EXECUTION

3.01 INSTALLATION

A. Conduit shall be supported in a method and at a spacing as approved by the NEC, except as described herein.

B. Conduit shall be supported by approved pipe straps or clamps.
   1. Conduit installed on the interior of exterior building walls shall be spaced off the wall surface a minimum of ¼" using "clamp backs" or strut.
   2. Pipe straps or clamps shall be secured by means of:
      a. Toggle bolts on hollow masonry.
      b. Metal expansion shields and machine screws, or standard preset inserts on concrete or solid masonry.
      c. Machine screws or bolts on metal surfaces.
      d. Wood screws on wood construction.

END OF SECTION

SECTION 26 03 00

ELECTRICAL TESTING

PART 1 GENERAL

1.01 DESCRIPTION

A. Provide electrical testing as described hereinafter.

PART 2 PRODUCTS

2.01 MATERIALS

Not used.

PART 3 EXECUTION

3.01 INSTALLATION

A. Feeder Insulation Resistance Testing: All current carrying phase conductors and neutrals shall be tested as installed and before connections are made for insulation resistance and accidental grounds. This shall be done with a 500-volt megger. The procedures listed below shall be followed:

1. Minimum readings shall be one million or more ohms for #6 AWG wire and smaller. 250,000 ohms or more for #4 AWG wire or larger, between conductors and between conductor and the grounding conductor.
2. After all fixtures, devices, and equipment are installed and all connections completed to each panel, the contractor shall disconnect the neutral feeder conductor from the neutral bar and take a megger reading between the neutral bar and the grounded enclosure. If this reading is less than 250,000 ohms, the contractor shall disconnect the branch circuit neutral wires from this neutral bar. He shall then test each one separately to the panel and until the low readings are found. The contractor shall correct troubles, reconnect, and retest until at least 250,000 ohms from the neutral bar to the grounded panel can be achieved with only the neutral feeder disconnected.
3. The contractor shall send a letter to the architect certifying that the above has been done in tabulating the megger readings for each panel. This shall be done at least four days prior to final inspection.

B. Ground System Testing: Upon completion of installation of the electrical grounding and bonding systems, the ground resistance shall be tested with a ground resistance tester. Where tests show resistance to ground as over 25 ohms, appropriate action should be taken to reduce the resistance to 25 ohms or less by driving additional ground rods. The compliance shall then be demonstrated by retesting.

C. Documentation:
   1. All tests specified shall be completely documented indicating time of day, date, and temperature, along with all pertinent test information.
   2. All required documentation of readings indicated above shall be submitted to the architect prior to and as one of the prerequisites for final acceptance of the project.

END OF SECTION

SECTION 26 04 00

ELECTRICAL POWER SERVICE AND GROUNDING

PART 1 GENERAL

1.01 DESCRIPTION

A. Electrical power service shall be taken underground at 120/208-volts, 3-phase, 4-wire, wye from new Knoxville Utilities Board pad mounted transformers as indicated on drawings and as called for hereinafter.

B. Install new underground facilities as required for utility company.

C. Carefully coordinate all work associated with new services with KUB.

D. Pay all costs associated with power service.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials shall be as specified elsewhere in these specifications.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide grounding for new services as set forth hereinafter. Provide two groups of three driven 5/8" x 10'0" long copperweld ground rods at each meter center. Bond each group of rods together by "Cadweld" process with a #4/0 AWG bare copper grounding conductor. From each group of rods, extend a #4/0 AWG bare copper grounding conductor and bond to ground bus/system neutral at new meter centers. Also, extend #3/0 AWG bare copper grounding conductor and bond to main metallic water pipes at points where they enter building. Ground structural steel in building footing in accordance with National Electrical Code requirements. Ground by direct connection all interior piping systems. Bond with #2/0 rebar in footer. Bond house panel with #1/0 to ground rods.

B. Install separate insulated grounding conductors in all conduit runs. Separate grounding conductor is not indicated on plans but shall be required. Ground equipment and lighting fixtures in accordance with code.

C. For all pole-mounted light fixtures, install driven ground rod in accordance with detail on plans.

D. Provide permanent plaque at each service location indicating location of other power service.

END OF SECTION

SECTION 26 05 00

WIRING FOR ELEVATOR EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Contractor shall furnish all work necessary for and reasonably incidental to the complete installation of elevator equipment as shown on drawings and called for hereinafter. It shall include necessary power, lighting, and fire alarm for elevator lobbies, elevator shaft, and elevator machine room.

B. See Related Section 14 24 23, Hydraulic Passenger Elevators.

1.02 REFERENCES

A. General Provisions of the Contractor, General, and Supplementary Conditions, and Division 1 Specification Sections, General Requirements, apply to this section.

PART 2 PRODUCTS

2.01 MATERIALS

A. Inside the elevator pit, where directed, contractor shall furnish and install a vaportight globe and guard wall-mounted fixture per elevator cab at location as directed by elevator manufacturer. Adjacent to light, where directed, install switch. At an elevation of 18" above floor adjacent to the ladder, furnish and install a duplex GFC 120-volt plug receptacle with weatherproof cover.

B. No wiring will be allowed within the elevator shaft except that as required for elevator operation. Location of any required wiring shall be as directed by either elevator inspector or elevator equipment manufacturer. No wiring shall be allowed within the elevator machine room except that which relates directly for operation of elevator machine room.

C. Within the elevator machine room, furnish and install the following for operation of elevator.

1. Furnish and install adjacent to the door a heavy-duty fused disconnect switch for each elevator controller. Switch shall be lockable. Exact location shall be as directed by elevator manufacturer. Switch shall have auxiliary contact kit on operating handle for shut-down of battery lowering system.
2. For each elevator controller, furnish and install adjacent to door a 20-amp, 120-volt fused disconnect switch for elevator lights and controls.
3. Within the elevator machine room, lighting shall be fluorescent utilizing lens fixtures as illustrated on drawings. A minimum of one fixture shall be equipped with a Bodine battery pack for emergency illumination.
4. Furnish and install within elevator machine room a minimum of two duplex GFCI receptacles. Exact location shall be as directed by elevator manufacturer.

5. Furnish and install a telephone receptacle per elevator within elevator machine room a point directed.

6. Furnish and install grounding for elevator system. Minimum ground size for each elevator is #6 AWG extended to the main distribution panel service ground.

7. Circuit breakers in switchboard or main distribution panel serving elevators shall be equipped with a 120-volt shunt trip operator connected to fire alarm system, whenever the building is sprinkled.

D. Furnish and install fire alarm system for elevator as follows:

1. Within each elevator lobby, furnish and install a ceiling-mounted smoke detector.

2. At the top of elevator shaft, furnish and install a heat detector (rate-of-rise) and a smoke detector as required by elevator code.

3. Within elevator machine room, furnish and install heat detector and smoke detector.

4. Where elevators are served with emergency power, provide a pair of conductors from contacts on the automatic transfer switch, serving the elevators to the elevator controllers to signal emergency operation.

PART 3 EXECUTION

3.01 INSTALLATION

A. Verify with authority having jurisdiction mode of operation of fire alarm system. Interconnect with fire alarm system to operate in sequence required. Connect elevator recall to fire alarm system.

B. Verify exact location of all wiring and devices with elevator manufacturer.

END OF SECTION

SECTION 26 05 19

LOW VOLTAGE, 600 VOLT CONDUCTORS

PART 1 GENERAL

1.01 SUMMARY

A. Furnish and install conductors throughout the raceway system and distribution of electrical energy for the lighting, and power, and control needs.

PART 2 PRODUCTS

2.01 MATERIALS

A. Use stranded conductors with spade type terminal ends. Minimum size shall be No.12 AWG. Insulate conductors with Type "THHN/THWN" insulation unless specifically indicated otherwise on the drawings. Rating shall be 600-volts, AC. Conductors for isolated power shall be XHHW insulation.

B. Connectors for conductors size No. 10 and 12 shall be approved type insulated twist-on wire nuts. Use hydraulic compression type connectors for conductors No. 8 and larger.

C. All conductors are to be copper, except for feeders over 200-ampere which may be equivalent ampacity aluminum conductors.

D. Metal clad (MC) cable shall be permissible for use for final connections to lay-in grid type lighting fixtures. Each final connection utilizing MC cable shall not exceed 6’0” in length. In addition, branch circuit wiring (20-ampere) within apartments only may be “MC” cable. Otherwise, the use of MC cable shall not be permitted on this project.

PART 3 EXECUTION

3.01 INSTALLATION

A. Conform to manufacturer's recommendations and latest standard practice of industry. Color code all conductor for phase, neutral, and ground reference, as follows:

PHASE	208/120v.
A	Black
B	Red
C	Blue
Neutral	White
Ground	Green

END OF SECTION

SECTION 26 05 33

RACEWAYS AND BOXES

PART 1 GENERAL

1.01 SUMMARY

A. Furnish and install a system of raceways and boxes for installation of conductors for distribution of power and communications throughout building. All wiring shall be in metallic conduit. Conduit shall be concealed except where specifically called for to be exposed, such as in mechanical/electrical equipment rooms.

B. Furnish outlet boxes for lighting fixtures, wall receptacles, switches, and other boxes as required. Also, pull boxes and junction boxes shall be furnished as required.

PART 2 PRODUCTS

2.01 RACEWAYS

A. Conduit lines inside building shall be in metal raceway. Conduit, with any portion of the run embedded in concrete, shall be rigid steel. Electric-metallic tubing may be elsewhere. Communications wiring inside building where concealed may be PVC.

B. Minimum size conduit on project shall be 1/2".

C. Wiring on exterior of building where underground shall be Schedule 40 polyvinyl chloride.

2.02 BUSHINGS

A. Bushings for conduit 2" in size and smaller shall be plastic. Conduit size 2-1/2" and larger shall be OZ Company type "B" Appleton Co. Efcor Series NO. 55 or approved equal with metal ring and insulator as an integral part of bushing.

2.03 CONDUIT COUPLINGS

A. Conduit couplings (EMT) shall be compression type.

2.04 FLEXIBLE CONDUIT

A. Flexible metal conduit shall be used for final connections for all motors, transformers, unit heaters, lighting fixtures, and other permanently connected equipment. Maximum length of flexible conduit shall be 24" except for connection of light fixtures, which may have a length of up to 72". The flexible conduit shall be constructed of hot-dipped galvanized, interlocked spirally wound steel strip. All connectors shall be galvanized and shall be listed for connection to the conduit and boxes. Provide a ground conductor in each length of flexible conduit. Flexible conduit used in mechanical rooms, kitchen areas, and damp or wet locations shall be liquid tight. Other than the uses listed above, the use of flexible conduit will not be permitted. The use of "MC" will not be considered.

2.05 MANUFACTURER

A. Conduit shall be as manufactured by Pittsburgh, National, Republic Steel Companies, General Electric Company, or approved equal.

2.06 CEILING BOXES

A. Ceiling outlet boxes shall be 4-inch octagon and 2-1/8 inch deep. Provide extension rings where additional volume is required. All ceiling outlet boxes shall have fixture stud of no-bolt, self-locking type installed if required to hang fixture specified at that outlet.

B. Where ceiling outlets occur in reinforced concrete, provide rings with removable back plate and fixture stud specifically designed for this purpose.

2.07 WALL BOXES

A. Light wall switch boxes shall be a minimum size of 4" high by 2-1/8" wide by 2-1/8" deep. Where more than one gang occurs, 4" square boxes or additional larger boxes shall be used with device ring attached. Boxes in masonry shall be 4" high and 2-1/2" deep with the number of gangs necessary. An example of the masonry box shall be Raco Co. No. 692 for 3-gang, No. 693 for 4-gang, etc.

B. Plug receptacle boxes shall be 4" square by 2-1/8" deep with a 4" square device cover, either one or two-gang as required. Covers shall be square cut, with a depth to accommodate the wall finish material with a minimum raised cut of 1/2".

C. In apartments, non-metallic boxes may be utilized, if U.L. listed for installation in 2-hour fire wall.

2.08 MANUFACTURER

A. Boxes and fittings shall be Appleton, Steel City, Raco, Efcor, Crouse-Hinds, or equal.

2.09 FABRICATION

A. Pull and junction boxes shall be galvanized or sherardized sheet metal or code thickness with lapped and welded joints and with 3/4" flange. They shall be rigidly supported on ceiling or wall. Conduit runs entering a box shall not be considered as adequate support.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Protect threads on rigid conduit during storage. To prevent entry of moisture and foreign matter in conduit during construction, install factory made conduit caps on conduit stubs. Swab conduit runs clean and dry prior to pulling wire.

B. Cut conduit square, ream smooth, and thread properly and fully. Paint job cut male threads with conductive lead paint prior to making up a threaded conduit joint.

C. Conduits shall be continuous from outlet to outlet and from outlet to panel or pull box. Connect conduit in building construction except as indicated. Secure conduit to all boxes and bushings with double locknuts so that system will be electrically continuous.

D. In concrete slabs, block up conduit from forms and securely fasten in place. All conduits in slabs shall have a minimum of 2 inch concrete coverage above and below. Install conduit in slab only where shown on drawings.

E. Where conduit is installed in poured concrete slabs and it crosses an expansion joint, an expansion fitting equal to OZ type "AX" with a bonding jumper type "AL" shall be installed. Use Crouse-Hinds, Appleton, or approved equal.

F. Install all conduit in a workmanlike manner with bends made using tools specifically designed for purpose to prevent kinks and flattened areas. Where electric metallic tubing is connected to an outlet box or panel, terminate tubing in an approved type connector and couple together with approved type connectors in order to insure adequate bonding.

G. Where conduit is installed above ceilings, secure it in place by attachment to building structural framing system with appropriate clamps manufactured for purpose of making conduit attachment.

H. Where conduit pierces a rated wall, provide a suitable seal to close openings. Refer to drawings for details.

I. Provide junction or pull boxes in conduit lines which have greater than 360-degrees in total bends.

J. Install pull and/or junction boxes in conduit lines wherever necessary to avoid excessive length of runs or number of bends in run. No run shall exceed 100 feet without a pull box.

K. Pull and junction boxes shall be accessible and sized in accordance with provisions of Article No. 370-18 of latest edition of National Electrical Code.

L. Pull and junction boxes shall be installed so that cover shall be accessible at all times.

END OF SECTION

SECTION 26 05 34
COMMUNICATION TERMINAL SPACES

PART 1 GENERAL

1.01 DESCRIPTION

A. Furnish and install communications terminal spaces as indicated on drawings and as called for hereinafter. Furnish and install in each apartment a central communications cabinet (CWP) for installation of TV, data, and voice cabling. Furnish and install all voice, data, and TV wiring, with the exception of service lines from service providers (AT&T and Comcast).

PART 2 PRODUCTS

2.01 MATERIALS

A. The communications terminal spaces shall consist of 3/4" AC grade plywood bolted to the wall with the top 6' above floor and the bottom 24" above floor, the width as shown to scale on the drawings. Provide Unistrut channel above and below the plywood to secure inbound and outbound conduit. Conduit at that location shall be fitted with bushings. Conduit shall be terminated in a horizontal position within 6" of the terminal mounting board. Paint plywood with two coats of fire resistant paint.

B. Each apartment shall have installed a flush-mounted cabinet (CWP), Hubbell Model N50BOX48, 48” high x 14” wide x 4” deep. Contractor shall install within cabinets duplex 120-volt receptacle.

PART 3 EXECUTION

3.01 INSTALLATION

A. Furnish and install at each space a No. 4 AWG copper grounding conductor extended to electrical service ground at meter center or House Panel.

B. Extend from each apartment central communications cabinet 2-3/4” to exterior facilities.

C. All data, voice, and TV outlets in each apartment shall have their cabling extended into the CWP.

END OF SECTION

SECTION 26 05 35

WIRING DEVICES

PART 1 GENERAL

1.01 DESCRIPTION

A. Furnish and install wall switches, plug receptacles, clock hanger outlets, etc., as specified hereafter and shown on the drawings. Devices offered as a substitute to those specified will be carefully checked to see that quality such as grounding continuity, retention force for insertion devices, are equal to those specified.

PART 2 PRODUCTS

2.01 MATERIALS

A. The plug receptacles shall be specification grade, side and back-wired, minimum rating of 20-amperes for voltage applied. Color of all devices shall be as directed by Architect. Provide ground fault circuit interrupter type (GFCI) duplex receptacles where indicated on drawings or otherwise required by code. GFCI devices shall be similar and equal to Pass and Seymour No. 2091 Series. Equip each duplex receptacle with an Erico RLC device leveler. All 120-volt receptacles, other than GFCI type, shall be tamper-resistant.

B. Wall switches shall be 20-amperes, minimum capacity and single pole, Bryant 4901, 3-way or 4-way as required. Other variations of the devices shall be as called for on the drawings. Where pilot lights are required, they shall be separately ganged.

C. Coverplates: Utilize nylon coverplates.

D. Colors: Colors of dimmers and coverplates shall be ivory.

E. Dimmers shall be Lutron Nova Series, slide to off.

F. Other type devices as called for on the drawings shall be of similar grade, rating as noted on drawings.

G. Alternate manufacturers: Alternate manufacturers' products will be approved together with satisfactory proof of compliance as to equal in quality to the product specified. Similar and equal products by the Hubbell Company, the Bryant Company, the Leviton Company, and the Eagle Company are approved.

PART 3 EXECUTION

3.01 INSTALLATION

A. Installation of devices shall be in accord with the manufacturer's recommendations. Grounding devices such as jumper straps between the device grounding pole and the

junction box, or the connection of a grounding conductor will be required at each plug receptacle. Where metal conduit serves the outlet box, a device using a "UL" listed grounding arrangement making use of the contact between the yoke and the device box is approved for use.

END OF SECTION

SECTION 26 05 36

FLOOR BOXES

PART 1 GENERAL

1.01 DESCRIPTION

A. Furnish and install flush floor boxes where indicated on drawings and as set forth hereinafter.

PART 2 PRODUCTS

2.01 MATERIALS

A. Flush floor boxes shall be similar and equal to Wiremold/Walker Company catalog No. RFB4-SS, 4-compartment combination box, or Hubbell SystemOne four-gang box. Each floor box shall contain two duplex plug receptacle brackets (RFB-RB-SS) and two quad RJ45 brackets (RFB-4TKO-SS). Activation covers for floor boxes shall be Walker catalog No. S39CCTCXX complete with wire management seals. Cover shall be suitable for use in carpet, tile, terrazzo, and wood-covered concrete floors. Activation covers shall be U.L. evaluated and approved to meet applicable U.S. and Canadian safety standards for scrub water exclusion. Activation covers shall be die cast aluminum with powder coat paint finish. Color shall be aluminum, rass, or black as selected by architect. Provide floor insert in covered doors to match floor finish. In each flush floor box indicated, provide two 120-volt, 20-ampere duplex plug receptacles.

B. Where “poke-through” type floor boxes are indicated, furnish and install a flush poke-thru type combination box, similar and equal to Wiremold Evolution 8ATC Series. Poke-through floor boxes shall be evaluated and approved to meet U.S. and Canadian Safety Standards for scrub water exclusion. Each poke-through floor box shall be equipped with two center mounted 120-volt, 20-ampere duplex plug receptacles, each with 8DP device plates. Each poke-through floor box shall also contain one 8ACT6A device plate with communications devices installed per drawings. Provide blank inserts on unused ports. Each poke-through shall be equipped with 8CTC Series cover assembly with door that opens a full 180 degrees. Provide an additional two 68 REC proprietary duplex plug receptacles in side compartments of each poke through device. Provide bottom housing assemblies as needed to allow input of power and communications wiring as noted on drawings. Finish of poke-through shall be gray, black, ivory, or solid brass as directed by architect.

PART 3 EXECUTION

3.01 INSTALLATION

A. In each flush floor box, provide two duplex plug receptacles in each of the compartments which are indicated to serve the electrical needs. Where greater capacities are required, they shall be as noted on drawings.

B. Verify all locations of floor boxes with architect prior to installation. Do not scale floor box location from electrical drawings.

C. Installation of flush floor boxes shall be in strict accordance with manufacturer's written recommendations.

END OF SECTION

SECTION 26 09 23

OCCUPANCY SENSORS

PART 1 GENERAL

1.01 DESCRIPTION

A. Furnish and install occupancy sensors and related equipment for control of lighting as indicated on drawings and as called for hereinafter.

PART 2 PRODUCTS

2.01 MATERIALS

A. Furnish and install occupancy sensors where indicated on drawings. Occupancy sensors shall be equipped with passive infrared and ultrasonic technologies. Occupancy sensors shall utilize dual sensing verification principle. Occupancy sensors shall contain a light level sensor which keeps sections of lighting off when ambient light is adequate. It also contains an isolated relay which allows the sensor to interface with EMS, HVAC, or other building control systems. Occupancy sensor shall be similar and equal to Sensomatic and be designed to fail in the on position. Occupancy sensors shall be wall- or ceiling-mounted as required.

B. Provide a power pack for occupancy sensors which provides 24-volt, DC, operating voltage to the 24-volt, DC, sensors. Power pack shall be capable of switching up to 20-amps of ballast load at 277-volts. Power pack shall be equipped with self-contained transformer relay system.

PART 3 EXECUTION

3.01 INSTALLATION

A. Refer to wiring diagrams on drawings for wiring requirements of occupancy sensors. Occupancy sensor installation shall be in accordance with manufacturer's recommendations.

B. Occupancy sensor manufacturer shall provide a five-year warranty for all equipment provided as part of this project. Entire installation shall be U.L. and C.U.L. listed.

END OF SECTION

SECTION 26 24 16

PANELBOARDS

PART 1 GENERAL

1.01 DESCRIPTION

A. Furnish and install panelboards with circuit breaker equipment as indicated on drawings and specified hereinafter.

B. Shop drawings shall be submitted for approval. Shop drawings shall be specific indicating busing, breaker dimensions, gutter dimension, number size, trip, and interrupting capacity of all circuits.

PART 2 PRODUCTS

2.01 MATERIALS

A. Apartment load centers shall have copper bus and main breaker. Cabinets shall be 14” x 3-7/8”. Use Square D “QO” or equal. Load centers shall have separate neutral and ground bus.

B. Branch circuit panelboards shall be of the circuit breaker, dead-front safety type equal to Square D types "NQOD" or “NF” with contents as indicated on panel scheduled, shall bear approved device label of UL, and shall meet all applicable requirements of National Electrical Manufacturers Association. Panelboards shall be the product of Square D, Siemens, General Electric, or Eaton.

C. Bus shall be copper.

D. Number of branch circuits, their rating, number of poles arrangements, etc., are indicated on drawings.

E. Panelboards shall have lugs (both main lugs and branch circuit lugs) suitable and UL approved for both aluminum and copper conductors. Such panelboards shall have their breakers labeled and approved by UL.

F. Provide neutral bars for all 4-wire system feeders. Isolate such neutral bars from the panel box.

G. Panels shall have a separate "ground bar" installed with lugs or connectors on bar. Such bar shall be grounded to panel box.

H. Bus bars shall be of sequence-phase type arranged for 120/208-volts or 480/277-volts, 3-phase, 4-wire mains. All circuits shown as common neutral shall be installed in accordance with National Electrical Code.

I. Balance all circuits in a panel to achieve not more than 10 percent unbalanced neutral current in panel feeder. Panel circuit numbering shall be revised as necessary and arranged to facilitate above.

J. Multiple breakers shall have common trip. Trip indication shall be as indicated by breaker handle moving to a position other than ON or OFF. Equip doors on panels with chrome-plated lock and a catch with two keys supplied for each lock, concealed hinges and attachment means. Panelboards shall be flush or surface mounted as required.

K. Furnish six handle "lock-on" devices for each panel for installation on circuits as directed by Owner to prevent unauthorized personnel from turning off circuits to controls, unit heaters, clocks, night lights, etc. Any spare lock-ons remaining shall be turned over to Owner.

L. Provide typed or printed directory cards under plastic on doors. Submit detailed drawings for approval showing size of cabinets, trim, detail for busing, locks, method of numbering, voltage, phase, etc., and obtain approval from Architect before manufacture is commenced.

M. Distribution or power panels shall be similar and equal to Square D I-line type or Siemens type CDP circuit breaker distribution panelboard.

N. Circuit breakers shall be fully rated and temperature rated for a 40 degrees C. ambient. All panelboards shall have lugs (both main lugs and branch circuit lugs) suitable and UL approved for aluminum and copper conductors. Such panelboards shall have their breakers labeled and approved by UL.

O. Breakers shall be of thermal magnetic type, sized and numbered as indicated on schedule on drawings, and shall be quick-make, with trip indication shown by a handle position other than ON or OFF with trip on all multipole breakers.

P. Minimum short circuit interrupting capacity shall be as indicated on panel schedule.

Q. Panelboard fronts shall have concealed hinges and attachment bolts, be complete with door cylinder lock and catch, all keyed alike. Fronts shall have adjusting indicating trim clamps and Bakelite nameplates engraved to indicate device, panel, or motor being served. Spare breakers and spaces only shall have nameplates with no engraving. Secure all nameplates to panelboard trim with two round head sheet metal screws.

R. Panelboards shall be UL approved. Panelboard main sizes, branch circuit rating, and mounting shall be as indicated on plans. Shop drawings shall be submitted for approval. Shop drawings shall be specific showing busing, breaker dimensions, gutter dimensions, spare space dimensions, number, size, trip, and interrupting capacity on all circuits. Standard factory work sheets will not be acceptable as shop drawings.

S. Circuit breakers serving package type air conditioning equipment shall be U.L listed HACR.

PART 3 EXECUTION

3.01 INSTALLATION

A. Unless directed otherwise, panelboards shall be mounted to have the top 6 feet clear above finished floor.

B. The directories within each panelboard shall be properly filled out, so as to have a comprehensive understanding of the loads to which each circuit breaker is connected. They shall be filled out by use of a typewriter.

C. Panelboards shall be painted to match adjacent walls and labeled inside with a suitable engraved, laminated plastic plate to identify the panelboard designation and its voltage.

END OF SECTION

SECTION 26 28 16
SAFETY SWITCHES

PART 1 GENERAL

1.01 DESCRIPTION

A. Furnish and install fuse safety switches and/or disconnect switches as called for on the drawings, and as may be otherwise required by the Codes.

PART 2 PRODUCTS

2.01 MATERIALS

A. Safety switches shall be heavy-duty, horsepower rated, quick-make, quick-break with arc shields with enclosed construction.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install where called for on the drawings and/or as required by the National Electrical Code.

B. Where disconnect or safety switches are called for away from walls, a suitable support shall be provided to allow the switch to be in a position of approximately 4-1/2 feet above floor. Where necessary, provide a steel frame attached to the floor or overhead structural system or both. Switches may be mounted on equipment where specific approval is realized from the supplier of the equipment, so as not to interfere with normal and ready maintenance of this equipment.

END OF SECTION

SECTION 26 29 13

MANUAL MOTOR STARTERS

PART 1 GENERAL

1.01 DESCRIPTION

A. Furnish and install manual motor starters for 120-volt equipment as shown on drawings and called for hereinafter.

PART 2 PRODUCTS

2.01 MATERIALS

A. Manual motor starters shall be equipped with melting alloy type thermal overload relay. Manual motor starters shall be provided with pilot lights. Unit shall be similar and equal to Square D Company 2510 Series, catalog No. FF-1P.

PART 3 EXECUTION

3.01 INSTALLATION

A. Manual motor starters shall be installed at HVAC equipment in accordance with NEC requirements for disconnecting means. Install in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 26 43 13

SURGE PROTECTION DEVICES

PART 1 GENERAL

1.01 DESCRIPTION

A. This section describes the materials and installation requirements for Surge Protection Devices (SPD's) formally known as Transient Voltage Surge Suppressors (TVSS). Provide device on main house panel.

1.02 REFERENCES

A. ANSI/IEEE C62.41-1991 and C62.45-1992.

B. National Electrical Manufacturers Association, NEMA LS-1, Revision 2007.

C. National Fire Protection Association, NFPA 70.

D. Underwriters' Laboratories UL 1449 and 1283.

1.03 MANUFACTURER'S QUALIFICATIONS

A. Manufacturers shall be ISO9000 certified.

B. Manufacturers shall have been engaged in the design and manufacturing of surge protection devices for at least ten (10) years.

C. The following manufacturers will be approved, provided they meet all specifications:
   1. ERICO Products Inc. 34600 Solon Road, Solon OH 44139
   2. Equal products by Leviton, Innovations Technology, APT, and Wiremold Sentrex.

1.04 WARRANTY

A. The manufacturer shall provide a minimum of a five (5) year warranty from the date of shipment against failure when installed in compliance with national and local electrical codes; and per the manufacturer's installation, operation and maintenance manuals. Products with warranties that exclude temporary over voltage conditions, abnormally high number of surges, direct or indirect lighting strikes shall not be used.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. The Surge Protection Device shall be listed to UL 1449 Edition 3 as a SPD Type 1 or SPD Type 2 Product.

B. The UL 1449 Edition 3 Nominal Discharge Current (In) for the Surge Protection Device shall be 20 kA. A Surge Protection Device with a UL 1449 Edition 3 Nominal Discharge Current listing of 3 kA, 5 kA, or 10 kA will not be accepted.

C. MCOV shall be greater than 115% of the nominal operating voltage.

D. The Surge Protection Device shall have a stand-off voltage rating twice the nominal voltage. The Surge Protection Device shall be able to withstand Temporary Over Voltage Conditions twice the nominal voltage for an indefinite period of time, without damage, removing components from the circuit, or interrupting panel.

E. The Surge Protection Device shall protect all modes via L-N, L-G and N-G modes of protection. For Delta power systems L-L and L-G protection modes shall be provided, with the ability to configure L-G to L-L for ungrounded systems.

F. Independent certification shall be provided proving that the Surge Protection Device meets the required 8/20µs per phase single shot surge rating, without failure of any fusing, disconnects or surge module. Bypassing of any fusing/disconnects for purpose of this test is not acceptable.

G. Each mode of the Surge Protection Device shall be rated to exceed the life cycle testing of ANSI/IEEE C62.45 by withstand of at least 200 operations at 10kA 8/20µs and at least 100 operation at 20 kA without failure.

H. The Surge Protection Device shall have a Short Circuit Current Rating (SCCR) of 200 kAIC, per UL 1449 Edition 3.

I. The Surge Protection Device shall be capable of withstanding multiple temporary over-voltage per UL 1449 Ed 2 Section 36 “Overvoltage Test”, & 37 “Abnormal Overvoltage Tests” without failure or need to reset or replace modules/fuses.

J. Each MOV shall be protected with individual thermal disconnect devices bonded directly to the MOV substrate for rapid and automatic disconnection of any MOV exhibiting excessive temperature. The following are not acceptable:
   1. Surge Protection Devices without thermal fuses/disconnects.
   2. Surge Protection Devices with shared thermal devices that disconnect more than one MOV.

K. For safety, the Surge Protection Device shall have a maximum continuous operating voltage (MCOV) of at least:

Power System	MCOV (L-N)
Single phase (2W+G) 220-240V	310V
Three phase (4W+G) 120/208 WYE	170V
Three phase (4W+G) 277/480 WYE	310V

L. Enclosure shall:
   1. Feature all metal NEMA 4 enclosure suitable for outdoor usage.
   2. The Surge Protection Device depth shall be less than 3.5” to allow mounting within wall cavity with optional flush mount kit.
   3. The Surge Protection Device width shall be less than 5” to enable installation between adjacent electrical enclosures.

2.02 Main Service Panels

Surge Protection Devices shall be installed at all AC service entrances of each building.

A. The Surge Protection Device shall incorporate 200kA 8/20µs MOV protection per phase.

B. The TVSS shall have the following status indications:
   1. Each individual mode of protection shall be separately monitored and displayed via a mechanical flag status indication for each mode.
   2. A LED status indication per phase.
   3. An overall status LED
   4. Form-C alarm contacts for remote alarming of faults
   5. Audible Alarm.
   6. A five (5) digit surge counter that cannot be reset.

C. The Surge Protection Device shall have a built-in disconnect that allows fusing and surge components to be removed without interrupting power, or disconnecting hard wire connections.

D. The following Voltage Protection Ratings (VPR) shall not be exceeded by the Surge Protection Device.

	Voltage Protection Rating	
Impulse standard (no AC applied)	120/240 V 120/208 V	277/480 V
ANSI/IEEE C62.41 Cat B3 3kA	600V	1000V
ANSI/UL 1449 Edition 3 20 kA Nominal Discharge Current Testing	1200V	1800V

E. At least -40dB @100 kHz EMI/RFI shall be provided L-N (L-L for Delta units). To avoid unsafe ground leakage current, no filtering shall connect to ground.

F. ERICO, CRITEC TDX200 Modular Series or similar meeting these specifications.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install Surge Protection Devices in full accordance with manufacturer's written instructions and comply with all applicable codes.

B. Surge Protection Devices with a UL 1449 Edition 3, Listing as a SPD Type 2 shall have a 30-amp circuit breaker or other size as recommended by the manufacturer's installation manuals. This independent circuit breaker will serve as a means of a disconnect for servicing the Surge Protection Device with the protected panel remaining energized.

C. Surge Protection Devices with a UL 1449 Edition 3 Listing as a SPD Type 1, and an integrated disconnect can be connected directly to the buss without a designated circuit breaker.

D. The Surge Protection Device shall be installed with the shortest possible leads, or conductor length, minimum No. 8 AWG.

END OF SECTION

SECTION 26 51 00

LIGHTING FIXTURES

PART 1 GENERAL

1.01 DESCRIPTION

A. Furnish and install the lighting fixtures as called for on the drawings and specified hereinafter. Equipment shall be complete including lamps and accessories with the mounting arrangement suitable for the mounting condition encountered.

PART 2 PRODUCTS

2.01 MATERIALS

A. The lighting fixtures shall be as listed in the lighting fixture schedule shown on the drawings.

B. Fluorescent lamps (4') shall be T-8, 28-watt, rapid start with minimum color rendering index of 82. Color temperature of fluorescent lamps shall be 3500-degrees K. Lamps shall be Sylvania, G.E., Osram, or Philips.

C. Fluorescent ballasts shall conform to the requirements of the Certified Ballasts Manufacturers and shall be tested and approved by the Electrical Testing Laboratories, Inc. See drawings for additional information.

D. H.I.D. ballasts shall be constant wattage autotransformer.

E. LED sources in the building interior shall have maximum color temperature of 3000-degrees C.

PART 3 EXECUTION

3.01 INSTALLATION

A. Each lighting fixture shall be secured to the ceiling or structural framing system. Attachment to ceiling board, metal lath, or gypsum panels is not satisfactory. Suitable framing must be provided to engage the actual structural elements of the building or ceiling.

B. Fixtures in lay-in ceiling applications shall be clipped to the ceiling framing as required by the National Electrical Code. Provide a sample installation for approval before fixtures are installed.

C. Except where prefabricated wiring is called for, fluorescent lighting fixtures shall be wired by the installation of a junction box at the fixture. Conduit connections directly to the fixture housing are not acceptable.

D. All noisy ballasts creating a hum shall be replaced as directed.

F. Verify the type of ceiling construction prior to shipping fixtures to the job.

G. Lamp warranty will begin at substantial completion; fluorescent fixtures shall be warranted two years, H.I.D. five years, LED five years.

END OF SECTION

SECTION 26 52 00

FLUORESCENT EMERGENCY BATTERY PACK

PART 1 GENERAL

1.01 DESCRIPTION

A. Emergency lighting for egress purposes shall be provided by the installation of battery units located at certain fluorescent fixtures. The battery pack will serve one lamp and will bring the lamp on when normal power is interrupted. Special wiring connection is required in order to allow the lighting fixture to be switched off and on as the room needs require, but also come on automatically when normal power is interrupted.

PART 2 PRODUCTS

2.01 MATERIALS

A. Battery units shall have a nickel cadmium battery which will supply 90 minutes of illumination at a minimum of 60 percent of initial output or produce 87.5 percent of rated voltage. The unit shall contain a built-in switching arrangement for transfer of normal power to the battery and a built-in charging element. Each fixture in which the battery pack is installed shall be equipped with a monitor light to indicate the present and charge condition of the battery pack. The unit shall be similar and equal to Bodine No. B50-N.

PART 3 EXECUTION

3.01 INSTALLATION

A. The battery pack shall have a separate full-time energized line brought to it so that it may monitor power being available at the panelboard. This shall be in addition to the switch line coming to the fixture that will turn the power off and on. So long as the monitor line to the panelboard is energized, the battery line will not operate. It will thus sense power failure or interruption and provide egress lighting.

B. The wiring arrangement shall insure that the lights can be turned off and on in a normal manner as other lights in the room and still function automatically to bring in emergency light when power is interrupted.

END OF SECTION

SECTION 26 53 00

EXIT SIGNS

PART 1 GENERAL

1.01 DESCRIPTION

A. Furnish and install exit signs where illustrated on the drawings. Mounting shall be as set forth on the drawings and described hereinafter. Each exit sign shall be equipped with built-in battery for operation during loss of normal power.

1.02 SUBMITTALS

A. Submit the manufacturer's complete specifications and installation instructions for equipment furnished under this section.

B. Submittals shall conform to Section 1C-Submittals.

1.03 WARRANTY

A. This contractor shall guarantee, in writing, all work done under this Contract to be free of defective material and workmanship for a period of one (1) year from date of substantial completion, and shall replace or repair any such defects at his own expense.

PART 2 PRODUCTS

2.01 MATERIALS

A. Unit shall be constructed of die cast aluminum.

B. Exposed metal shall be matte white enamel finish. Letters shall be green.

C. Each unit shall contain LED's with energy consumption of 6.5 watts. Input voltage shall be rated 120/277-volts.

D. The equipment shall be similar and equal to Lithonia Company Quantum Series No. LESW1G120/277ELN, with nicad battery backup. Similar equipment by the Emergilite Company, the Dual-Lite Company, Sure-Lite Company, and the Chloride Company is approved. The unit mounted on a lay-in type ceiling shall be supported by use of a Caddy Company acoustical "Tee Bar" box hanger, catalog No. 512 or similar product.

PART 3 EXECUTION

3.01 INSTALLATION

A. The unit shall be arranged for the mounting called for on the drawings, either single face or double face or either ceiling mounting or wall mounting. Directional arrows shall be provided as indicated. Where ceilings above 9' are involved, the ceiling mounted units are to be pendant mounted to where the bottom of the sign is approximately 8'6" above floor.

B. Conform to the manufacturers recommendations.

END OF SECTION

SECTION 26 54 00

TWIN HEAD EMERGENCY LIGHTING UNIT

PART 1 GENERAL

1.01 DESCRIPTION

A. Furnish and install twin-head emergency lighting units where shown. Unit shall be wall mounted as indicated on drawings. This unit shall have built-in battery, self chargeable and twin adjustable incandescent lamps. It shall be used to furnish emergency lighting in case of interruption of normal power. It shall automatically switch the lights on when normal power is interrupted.

PART 2 PRODUCTS

2.01 MATERIALS

A. The wall-mounted unit shall have nickel-cadmium battery unit with self charger and automatic switching devices, and integral time delay similar and equal to Lithonia Company No. ELU4X-TD-N. It shall be equipped with a transfer circuit which will prevent deep discharging of batteries. Equip the unit with an alarm which will supervise battery electrolight levels, produce a visual alarm when level reaches refill point.

PART 3 EXECUTION

3.01 INSTALLATION

A. Conform to the manufacturer's recommendations. Emergency lighting battery units shall be hardwired to unswitched lighting circuit(s) serving area where units are located.

END OF SECTION

SECTION 27 05 29

LOW-VOLTAGE CABLING SUPPORT SYSTEM

PART 1 GENERAL

1.01 DESCRIPTION

A. Furnish and install a system of cabling supports above lay-in ceilings for low-voltage (data wiring, computer, emergency call, door access control, etc.) wiring.

PART 2 PRODUCTS

2.01 MATERIALS

A. Low-voltage cable support system shall be J-hook system, similar and equal to Steel Cooper BCH Series. Non-metallic J-hook system by Panduit or equal will also be approved for use.

B. Provide separate J-hook systems for 1) voice/data network, and (2) CATV, CCTV, security, access control.

C. Provide all necessary supports and attachments to allow connection to structure for these supports. Where wall mounted above ceiling, J-hook supports shall be secured directly to metal studs or masonry walls. J-hooks shall not be permitted to be attached directly to gypboard walls.

PART 3 EXECUTION

3.01 INSTALLATION

A. Low voltage cabling shall only be permitted to be run exposed in low voltage cabling support system above accessible lay-in ceilings in communications rooms and in mechanical mezzanine spaces. Otherwise, all low voltage cabling shall be run in conduit in areas where there is no lay-in ceiling (i.e., gymnasium, etc.)

B. Cabling supports shall be located minimum 4’ to 5’ on center throughout entire length of low-voltage cabling runs above ceiling. Locate supports well clear of acoustical lay-in ceiling tiles. Supports shall be located such that tiles can be removed without interfering with support system.

C. Maximum number of data network cables to be installed per J-hook shall be forty (40). Provide additional sets of J-hook support systems as needed to support data network cables.

D. Coordinate installation of low-voltage supports with other trades as required.

E. Entire installation shall be in accordance with manufacturer’s recommendations.

END OF SECTION

SECTION 27 10 20

VOICE AND NETWORK CABLING SYSTEM

PART 1 GENERAL

1.01 DESCRIPTION

A. Furnish and install voice and network cabling for the building as indicated on drawings and as called for hereinafter. This specification is for a network cabling system. Products specified hereinafter shall be tested to 400 megaHertz, ETL verified.

B. This standard also establishes performance criteria for various system configurations and their elements.

C. All UTP terminations are to be to the T68A wiring scheme.

D. Provide new voice, data, and cable TV wiring within each apartment. All voice/data outlets shall receive a Cat 5e cable. TV outlets shall receive one Cat 5e and one RG-6.

E. For communications outlets in building not located in apartments, provide one Cat 5e cable to TTS, install RJ45 jack at outlet, terminate on patch panel at TTS.

F. Provide for all closed-circuit TV cameras, one Cat 5e cable to CCTV switch to be provided by others.

1.02 CABLING STRUCTURE

A. The elements of a cabling system are listed below:
   1. Horizontal Cabling
   2. Backbone Cabling
   3. Work Area
   4. Telecommunications Room
   5. Equipment Room
   6. Entrance Facilities

B. HORIZONTAL CABLING
   1. Horizontal cabling shall be of star topology, each work area connector shall be connected to a telecommunications closet. The maximum horizontal distance shall be 90 meters. An additional 10 meters is allowed for work area cables, patch cables, etc.
   2. The amount of untwisting of individual pairs to terminate shall be less than or equal to .5 in. for Category 5E.
   3. Cable bend radius shall not be less than 4 times the cable diameter.

C. BACKBONE CABLING:
   1. The purpose of backbone cabling is to provide interconnections between telecommunications entrance facilities, equipment rooms and closets. The backbone cabling includes transmission media, intermediate and main cross-connects, and mechanical terminations.
   2. Backbone cabling shall use the conventional hierarchical star topology.

D. WORK AREA:
   1. Some networks require application specific electrical components on the telecommunications outlet of the horizontal cabling. These application specific components shall not be installed as part of the horizontal cabling.
   2. When needed they shall be placed external to the outlet.

E. REFERENCE STANDARDS
   1. BICSI TDMM 12th Edition (Telecommunications Distribution Methods Manual).
   2. ANSI/NECA/BICSCI-568, Standard for Installing Commercial Building Telecommunications Cable.
   3. ANSI/TIA/EIA 569-B, General Building Standards for Telecommunications Pathways and Spaces.
   4. ANSI/TIA/EIA 568-B, Commercial Building Telecommunications Cabling Standard.
   5. ANSI/TIA/EIA 606-A, Administration Standard for Commercial Telecommunications Infrastructure.
   6. ANSI/TIA/EIA 758, Customer Owned Outside Plant Telecommunications Cabling Standard.
   7. ANSI/TIA/EIA-526, 7 and 14, Telecommunications Measurements of Optical Fiber Single and Multi Mode Power Loss.
   8. FCC 68, Connection of Terminal Equipment to the Telephone Network.
   9. ADA of 1992 and Telecommunications Act of 1996, Physically Impaired and Accessibility.
   10 BICSI ITSIMM current edition (Information Technology Systems Installation Methods Manual).
   11. ANSI/TIA/EIA 568-C.0, Generic Telecommunications Cabling for Customer Premises Standard Series.

       568-C.1 Commercial Building Cabling

       568-C.2 Copper Cabling Components

       568-C.3 Fiber Cabling Components

       568-C.4 Coax Cabling Component
   12. NFPA-70, NEC-2008 (National Electrical Code).
   13. All applicable State, Municipal, and Campus codes, standards and statutes.

F. ADMINISTRATION STANDARD FOR COMMUNICATIONS INFRASTRUCTURE:
   1. Purpose: The purpose of this standard is to provide a uniform administration scheme that is independent of the applications. This standard defines guidelines for contractors involved in the installation of the computer cabling system.
   2. Scope: This standard specifies the administrative requirements of the communications infrastructure within a building or campus.
   3. Areas to be administered are as follows:
      a) Terminations for the communications media
      b) Communications media between terminations
      c) Pathways between terminations
      d) Spaces where terminations are located

e) Bonding and grounding

4. Pathway and Space Administration: All spaces must be labeled. Labels should be affixed at the entrance of the space.
5. Wiring System Administration: This section describes the administration of cables, termination hardware, splices and termination position. As changes are made, effected labels, records, drawings and reports shall be updated.
   a) Horizontal and backbone subsystem cables shall be labeled at each end. Labels shall be used instead of marking the cable. Label intermediate locations such as manholes, pull boxes and conduit ends.
   b) Each termination hardware or label shall be marked with an identifier.
   c) Each termination position label shall be recorded with an identifier.
   d) Each splice closure or label shall be marked with an identifier.
   e) "TMGB" shall be marked on the Telecommunications Main Grounding Busbar.

G. LABELING AND COLOR CODING:
1. Labels are divided into 3 categories:

   Adhesive

   Insert

   Other
   a) Adhesive labels shall meet adhesion, defacement and legibility requirements defined in U.L. 969. Labels shall also meet exposure requirements in U.L. 969.
   b) Insert labels shall also meet U.L. 969 requirements for defacement, legibility and general exposure.
   c) Other labels include special purpose labels, such as tie-on labels.
2. All bar codes shall be either Code 39 or Code 128 confirming to USS-39 and USS-128 respectively. All Code 39 bar code ratios shall be within 2.5:1 to 3.0:1. If a wand scanner is to be used, a minimum quiet zone of 6.35mm is required on each side of the bar code.

H. COLOR CODING RULES:
1. Termination labels at the two ends of the cable shall be of the same color.
2. Cross-connectors made between termination fields are generally of two different colors.
3. The color orange is used for the demarcation point.
4. Green is for the network connections on the customer side of the demarcation point.
5. Purple is for the termination of cables originating from common equipment.
6. White is for the first level backbone media.
7. Gray is for the second level backbone.
8. Blue is for the termination of station telecommunicators media.
9. Brown is for interbuilding backbone cable terminations.
10. Yellow is for termination of auxiliary circuits, alarms, security, and other miscellaneous circuits.

I. DIFFERENTIATION OF TERMINATION FIELDS BY PERFORMANCE CATEGORY
   1. If cables are of different performance classes, their ends should indicate the difference. The labels shall be marked with the proper category of the cable.

J. INSTALLER QUALIFICATIONS
   1. Installer of cabling installation specified herein must be a certified trained installer using ANSI TIA/EIA Standards and the current edition of the BICSI TDMM (Telecommunications Distribution Methods Manual, Tenth Edition) as a guide for installation of inside cabling and associated components. Installer must have experience using Mohawk/Hubbell Cabling Systems. Provide written documentation of these qualifications as part of the submittal process.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cables:
   1. CAT 6e Cable, Hitachi ECO 30237-8-BL-2 or Hubbell Nextspeed C5RRB.

B. Connectors:
   1. CAT 6 Jacks, Hubbell Nextspeed, Orange, HXJ5OR.
   2. Data Jack Icon, Hubbell IR100C
   3. Phone Jack Icon, Hubbell IGY100T.

C. Cross-Connects:
   1. CAT6 Patch Panel, 48 port, Hubbell, Nextspeed, Black, P6E48U.
   2. CAT6 Patch Panel, 24 port, Hubbell, Nextspeed, Black, P6E24U.
   3. 110 Blocks, Backbone, 5 pair, Hubbell, 110BLK50FTK5.
   4. 110 Blocks, Horizontal, 4 pair, Hubbell, 110BLK50FTK4.
   5. UTP Protectors (CAT3) Circa 1880 series, 110 block, 5 pin modules 330-180.

D. Cable Management:
   1. Network Rack with “3.25” C-Channels, Black, Hubbell Nextframe CS-1973.
   2. Horizontal Management, Hubbell, HC219CE3N.
   3. Cable Management Rings, Hubbell, MCCPSR4.
   4. Cable Management Troughs, (110 blocks), Hubbell, 110TRA.
   5. Cable Tray, (for ER/TR) Hubbell Next Frame, 18”, “HL” Series, or Cooper B-Line SB17U18B.
   6. Cable Tray, (for corridors), Hubbell, 18”, “HPW” Series, or Cooper B-Line SB17U18B.
   7. Wire Basket, Cooper B-Line, WB212.
   8. J-Hooks, (up to 40 cables), Cooper B-Line BCH32.
   9. J-Hooks, (up to 10 cables), Cooper B-Line BCH12.
   10. Equipment Shelf, Hubbell MCCCS19P.

E. Work Area Outlets:
   1. Office/Classroom Faceplate, 4 port, Hubbell AFP14EI (Electrical Ivory).
   2. Blank Faceplate inserts, Hubbell, Electrical Ivory SFBE10.

3. Blank Faceplate inserts, Hubbell, Black, SFBB10.
4. Blank Faceplate inserts, Hubbell, Gray, SFBG10.

F. Miscellaneous:
1. Firestop Hilti "Moldable Pliable Putty" CP-618. *Tube putty and caulk that cures to an elastomeric solid is not approved in conduit.*
2. Fire Retardant Paint, Benjamin Moore M59-220 (white), up to 2 oz. of tint allowed per gallon.
3. Telecommunications Grounding Busbar (TGB), Homaco WMBB-12 or Hubbell RKTGB.
4. Power Strip, (for network rack), Hubbell PR10420.

G. Wall-Station Jacks:
1. Network: Hubbell Speedgain, blue, HXJ5EB.
2. Network Icon: Hubbell IR, 100C.

H. Wall-Station Faceplates: Wall station faceplates in office areas shall be Hubbell AFP14EI Series with four port angled plate, color to match electrical outlets. All unused ports shall be provided with blank inserts, Hubbell SFBE10 Series. Provide blank inserts as required.

I. All network horizontal cabling shall be Cat 6 cable. Plenum-rated cable shall only be required in areas where "plenum return" is provided as part of HVAC system. Otherwise, non-plenum rated cable shall be permissible. All network cable shall have blue outer insulation.

Plenum Rated: Mohawk M56168.

Non-Plenum Rated: Mohawk M56167.

Leave 8" of slack for each termination at wall outlet location. Leave one meter (3.28') slack above each wall outlet location. Cable slack shall not be stored in bundled loops. Cable slack shall be stored in an extended loop or in a Figure 8 configuration.

PART 3 EXECUTION

3.01 INTERIOR BUILDING INSTALLATION:

A. Wiring to central apartment panels shall be installed by others (AT&T or Comcast).

B. Installation of all data wiring facilities shall be by personnel regularly engaged in the installation of local area network cabling.

C. All wiring shall be color coded and terminated. All cabling shall be Cat 6 terminated to T568A wiring scheme.

D. Submit shop drawings for approval.

E. All cables shall be tested for shorts, crossed, opens, grounds, splits, and transpositions. Each cable pair will be tested and documented and the test results will be supplied to the owner for review and acceptance. Each Category 6 cable will be tested for wire map, lengths, insertion loss, NEXT, PSNEXT, ELFEXT, PSELFEXT, return loss, propogation delay, and delay skew. Each cable shall be tested utilizing a Level 3 tester. The test equipment will be capable of testing Category 5E cables. Fiber optic test will measure the end to end attenuation bidirectional at

their two corresponding wavelengths, multi-mode at 850 nm and 1300 nm, single-mode at 1310 nm and 1550 nm. All fibers shall be measured for overall length. Each cable will be documented on a hard copy and floppy disk format for review and acceptance by owner. The owner will evaluate the test results for "pass/fail". Contractor shall satisfactorily repair any failed cable test such that all cables pass as required.

F. During installation of cabling, the bend radius of cables is not to be less than the manufacturer's specific recommendation. Minimum bend radius shall be 10 times the diameter of the cable for fiber optic cable, and 4 times the diameter of the cable for copper cable. Contractor shall take and precaution not to exceed maximum tensile rating of cabling during installation.

G. Each horizontal cabling run shall include 10' of slack at telecommunications room end and 8" of slack at the outlet end. There shall also be one meter (3.28') of slack above each wall outlet and one meter stack in distribution panel. Station cables in the telecommunications rooms can be stored in a "Figure 8" configuration to maintain the proper bend radius and provide the needed slack.

H. Labeling of cables, wall outlets, 110 blocks, conduits, cable trays, patch panels, and backbone cabling shall be performed in accordance with requirements of the Owner.

I. All testing requirements set forth in this section shall be performed by an independent third party company regularly engaged in testing of communications installations such as this.

J. As part of close-out documents, contractor shall provide "as built" drawings for communications wiring system which shall include rack layouts, backbone routes, and wall outlet locations with all labeling information included.

3.02 WARRANTY

A. Provide 10-year warranty of system as set forth hereinafter.

END OF SECTION

SECTION 28 31 00

FIRE ALARM SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

A. Furnish and install a complete Addressable Fire Detection and Evacuation System as described herein and as shown on the electrical plans, to be wired, connected, tested and left in first-class operating condition. The system shall use ADDRESSABLE TRUEALARM initiating device circuits with required supervision. All equipment herein specified shall be manufactured by SimplexGrinnell or Notifier and shall be U.L. listed. The entire installation shall conform to the applicable sections of NFPA-72 National Fire Alarm Code, NFPA-101 Life Safety Code , N.E.C. Article 760, The Americans With Disabilities Act, and Local Authorities Having Jurisdiction.

B. The existing fire alarm system shall remain in place active until new system is installed, operational and tested.

C. The Fire Alarm Equipment supplier shall:
   1. Be an Alarm Systems Contractor licensed by the State of Tennessee Department of Commerce and Insurance and shall include a copy of The License in the Equipment Submissions.
   2. Have NICET Certified Employees for the sale, supervision and final testing of the equipment and shall include a copy of The Certification of at least one employee in the Equipment Submissions.

D. Provide equipment submissions including the following:
   1. Complete descriptive data indicating UL listing for all system components.
   2. Complete CAD drawings of the proposed system showing conduit layout, wire count and device locations.

E. Co-ordinate and install required ANCILLARY ALARM FUNCTIONS where shown on the electrical plans. Examples are MONITORING OF HOOD EXTINGUISHING SYSTEMS, SPRINKLER SYSTEMS, HVAC CONTROL.

F. The requirements of the conditions of the Contract, Supplementary Conditions and General Requirements, apply to the work specified in this section.

1.02 QUALITY ASSURANCE

A. Each and all items of the Fire Alarm System shall be listed as a product of a SINGLE fire alarm system manufacturer under the appropriate category by Underwriters' Laboratories, Inc. (UL), and shall bear the "U.L." label. All control equipment is to be listed under UL category UOJZ as a single control unit. Partial listing shall NOT be acceptable.

B. The equipment and installation supervision furnished under this specification is to be provided by a supplier who has been engaged in production of this type (software driven) of equipment for at least ten (10) years, and has a fully-equipped service organization within one hundred (100) miles of the installation.

C. All control equipment is to be listed under U.L. category UOJZ as a single control unit. Partial listing shall not be accepted. The system controls shall be UL listed for Power Limited Applications per NEC 760. All circuits must be marked in accordance with NEC article 760-23.

1.03 SYSTEM OPERATION

A. The system alarm operation subsequent to the alarm activation of any initiation device shall be as follows:
   1. The appropriate zones in alarm shall be displayed on the two line 80 character LCD Display.
   2. All alarm indicating appliances shall be active until silenced by the Alarm Silence Switch.
   3. Any electro-mechanically held doors shall close.
   4. A supervised signal to notify a central monitoring station shall be activated.
   5. The mechanical controls shall activate per NFPA as required.
   6. Any elevator control functions shall activate as required.

B. POWER REQUIREMENTS
   1. The control panel shall receive 120 VAC power via a dedicated fused disconnect circuit.
   2. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal 120 VAC power in a normal supervisory mode for a period of twenty-four (24) hours with five (5) minutes of alarm indication at the end of this period or as required.
   3. Circuits requiring system operating power shall be 24VDC and individually fused at the control panel.

PART 2 PRODUCTS

2.01 MATERIALS

A. FIRE ALARM CONTROL PANEL with a MINIMUM OF (254) ACTIVE POINTS - expandable to (1000), capable of supporting alarm initiating appliances and alarm indicating appliances as required in this specification.

The control panel shall be software programmable via the front panel for input/output functions and shall contain a historical event log.

Control panel status and custom labels shall be displayed by an alphanumeric LCD display (80 characters). Front panel switches shall provide control and programming. Displayed information indicates which zones are in alarm, supervisory, or trouble and also indicates additional panel status such as auxiliary output per zone, low battery, ground fault, and other pertinent information.

Each fire alarm control panel shall be provided with necessary power supplies, batteries, zone modules, etc., to serve all devices shown on contract documents, plus 10 percent of each device type in each building.

System Walk Test operation that shall allow the system to be tested by a single person.

CONTROL PANEL REMOTE REPORTING - Install either an IP-based digital communicator, cellular communicators, or radio frequency device as approved by the City of Knoxville. These shall be powered from 24-volt operating voltage and battery backup provided by fire alarm control panel.

The system shall incorporate one-way voice communication and tone generating capabilities.

A central audio control module shall be provided where required for the necessary alarm message/tone generation, main and remote microphone connections, music inputs, and mixer/pre-amplifier circuits. Continuous supervision shall be provided along with specific information as to the type of failure should a problem occur (eg. main microphone trouble, tone trouble, etc.). Audio outputs shall have individual gain control.

A hand-held, push-to-talk microphone shall be provided, recessed within a protective panel-mounted enclosure. The microphone shall be a noise-cancelling communication type with a frequency range of 200 Hz to 4000 Hz and shall be equipped with a self-winding five foot coiled cable. An LED indicator shall be provided to indicate the microphone push-to-talk button has been pressed and speaker circuits are ready for transmission. The microphone shall be supervised for disconnection.

An audio control switch module shall be furnished to provide manual access to audio operations for authorized personnel. The module shall include an "ALL Circuits" switch, "Aux Tone 1" switch, "Aux Tone 2" switch, tone generator stop switch, and "Audio Trouble Reset" switch. These switches and associated LED indicators shall be supervised for disarrangement or failure.

Audio power amplifiers shall be furnished with a self-contained filtered 24VDC power supply, transformer, and amplifier monitor circuits. The amplifiers shall provide a 25 Volt RMS output with a frequency response of 120 Hz to 12,000 Hz. Provide sufficient amplification to operate all system speakers simultaneously, plus capacity to serve an additional 25 percent of speakers over and above the quantities shown on Contract Drawings.

The speaker circuits shall be capable of supplying 25 Volt RMS audio power from the system amplifiers. Supervision for open, short, or ground fault conditions shall be provided. Individual and distinct trouble indications shall be provided for each fault. Provide one circuit for each zone or area of distinct communication.

Digitized tones, minimum of 8, for alarm (slow whoop) and auxiliary requirements (wail, horn, chime, etc.) shall be provided.

A pre-recorded digitized voice message capability is to be provided for automatic transmission to building occupants during alarm conditions. The automatic message player shall not rely on a tape or other mechanical means of transmitting the evacuation message. Systems that use tape players must provide, as a minimum, a backup tape player designed to automatically operate (within 2 seconds) if the primary tape player jams or otherwise fails to operate. A standard evacuation message shall be provided under this contract, however, the message player must be capable of transmitting a custom message of up to five (5) minutes long. A self-contained speaker will provide testing of the message(s) without disturbing the occupants of the facility.

A remote microphone/annunciator command location where shown on the electrical plans shall be provided to duplicate the manual voice transmission capability of the main fire alarm control panel.

B. Automatic Voice Evacuation Sequence

1. The audio alarm signal shall consist of an alarm tone for a maximum of 15 seconds followed by automatic pre-selected voice evacuation messages. At the end of each voice evacuation message, the alarm tone shall resume. The alarm tones shall sound alternately until the alarm silence switch at the fire alarm control panel has been operated.
2. All audio alarm operations (speaker circuit selection and alarm tone/voice message timing variations) shall be activated by the system software so that any required future changes to the evacuation sequence can be facilitated by authorized personnel without any component rewiring.

C. Manual Voice Paging Sequence

1. The system shall be configured to allow selective voice paging, minimum 1 circuit per floor. Upon activation of any speaker manual control switch, two (2) attention getting beeps shall sound over the speakers indicating an impending voice message will occur.
2. If any speaker manual control switches are activated, the control panel operator shall be able to make announcements via the push-to-talk paging microphone over the preselected speakers.
3. Facility for total building evacuation and paging shall be provided to allow for activation of all speakers. This shall be accomplished by the means of an "All Circuit" switch.

D. REMOTE ANNUNCIATOR(S): Where shown on the electrical plans, provide and install a Serial Annunciator. The serial annunciator shall provide an alphanumeric, 80 Character Liquid Crystal Display (LCD) that provides clear language information as to the 4100 point status (alarm, trouble, etc.), type of alarm (smoke detector, pull station, etc.), number of alarms on the system, and a custom location label. The annunciator(s) shall have a [beige enamel] finish. The annunciator shall communicate to the control panel over one twisted, shielded pair of wire and operating power shall be 24VDC and be fused at the control panel. Point-wired annunciators will not be considered as equal. Status information of each device may be individually displayed to investigate specific point detail. Four programmable control switches with associated LEDs are available for custom control functions. Manual Control Switches shall function and be the same as those on the 4100 Control Panel.

E. ADDRESSABLE MANUAL PULL STATION: Addressable pull stations will contain electronics that communicate the station's status (alarm, normal) to the control panel over two wires which also provide power to the pull station. The address will be set on each station. Pull stations shall be single action.

F. TrueAlarm Sensors and Addressable Sensor Bases CEILING, DUCT, AND HEAT SENSORS: Addressable smoke sensors shall be of the photoelectric type and shall communicate actual smoke chamber values to the system control panel. Each sensor shall contain a magnetically actuated test switch to provide for easy alarm testing at the sensor location. Each sensor shall be scanned by the control panel for its type identification to prevent inadvertent substitution of another sensor type. The control panel shall operate with the installed device but shall initiate a "Wrong Device" trouble condition until the proper type is installed or the programmed sensor type is changed.

G. ADDRESSABLE TRUEALARM HEAT SENSOR - Addressable temperature sensors shall sense within a temperature range of 32°F to 158°F. The control panel will be capable of sensing either a set point of 135°F, or a rate-of-rise of 20°F per minute for fire sensing. For utility sensing, a set point may be chosen within the stated range and the control panel programming will be capable of using that information to determine specific response such as warning of failure of local temperature controls.

H. ADDRESSABLE ZONE MODULES - Zone Modules shall only be used for monitoring of water flow, valve tamper, and for control HVAC systems.
   1. Individual Addressable Module (IAM) shall be used to monitor devices such as sprinkler, kitchen hood etc. Only 1 contact per Monitor Module shall be permitted.
   2. Control Addressable Module (CAM) shall be provided with Form C contacts for interfacing HVAC devices, elevator/sprinkler control, etc., to an addressable signaling line circuit for non-supervised control.

I. ADDRESSABLE DUCT HOUSINGS: True Alarm Duct Housing with a programmable relay for HVAC Control. This programmable relay shall be programmed to operate the air handling unit and shall not require 1 of the CPU addresses.

J. ADDRESSABLE SENSOR BASES
   1. Each 4098-9792 sensor base shall contain a LED that will flash each time it is scanned by the control panel (once every 4 seconds). When the control panel determines that a sensor is in the alarm or a trouble condition, the control panel shall command the LED on that sensor's base to turn on steady indicating the abnormal condition. Sensors which do not provide a visible indication of an abnormal condition at the sensor location shall not be acceptable.
   2. Sensor bases, as shown on the plans, shall be provided with a relay driver output that is to be controlled either automatically or manually from the control panel. This programmable output shall not require 1 of the CPU addresses.

K. SOUNDER BASES: In apartments where single station detectors are shown, provide 88 dba sounder base 4098-9794. Sound level of bases shall meet the recent 520 Hz requirement. Base shall sound on local alarm and any building alarm. Local alarms shall sound only base whose detector is in alarm, and sound trouble at FACP.

L. Audio Visual Xenon Strobe / Speaker: Wall Mount Audio Visual Unit. Use white or beige color device with red letters.

M. Visual Only Xenon Strobe: Wall Mount Visual Only Xenon Strobe Unit. Use white device with red letters.

N. Water Flow / Tamper / PIV Switch.

O. Door Holders: 24 VDC, wall mounted or floor mounted as required.

P. Spare Materials
   1. In addition to materials shown on contract drawings, contractor shall furnish and install the following quantities of specific fire alarm devices where directed in field by Engineer or where directed by Authority Having Jurisdiction.
      Manual Pull Stations: Two (2)

Visual Strobes: Four (4)
Combination Visual Strobes/Speakers: Four (4)
Ceiling Mounted Smoke Detectors: Two (2)
Ceiling Mounted Heat Detectors: Two (2)
Duct-Type Smoke Detectors: Two (2)

2. At conclusion of job, contractor shall turn over to owner the following materials: Two (2) manual pull stations, two (2) visual strobes, two (2) combination speaker/strobes, one (1) heat detector.

PART 3 EXECUTION

3.01 SYSTEM INSTALLATION AND WIRING

A. Provide and install the system in accordance with the plans and specifications, all applicable codes and the manufacturer's recommendations. All wiring shall be installed in strict compliance with all the provisions of NEC - Article 760 A and C, Power-Limited Fire Protective Signaling Circuits or if required may be reclassified as non-power limited and wired in accordance with NEC-Article 760 A and B. Upon completion, the contractor shall so certify in writing to the owner and general contractor.

All junction boxes shall be labeled red as "Fire Alarm" with a permanent marker. Wiring color code shall be maintained throughout the installation. It is permissible to install wiring without conduit in areas not subject to physical damage.

B. Installation of equipment and devices that pertain to other work in the contract shall be closely coordinated with the appropriate subcontractors.

3.02 SYSTEM TESTING

A. The completed system shall be fully tested by the contractor and the manufacturer's NICET CERTIFIED technical representative in the presence of the owner's representative. Upon completion of a successful test, the contractor shall so verify in writing to the owner, architect, and general contractor.

B. The following test shall be performed by the Fire Alarm Manufacturer's authorized representative. Each and every device shall be tested for it's intended function. Verify that each device is located in its appropriate location. Written verification of this test shall be provided to the owner, architect, and general contractor. This test shall be performed in accordance with NFPA 72 National Fire Alarm Code 1993.

C. The fire alarm supplier shall own and maintain a smoke detector analyzer for on site sensitivity testing of smoke detectors per NFPA. The analyzer shall be made available to the owner for such tests.

3.03 SYSTEM SERVICE SUPPORT

A. The system's supplier must employ factory trained technicians and maintain a service organization within 100 miles of the job site. This organization must have a minimum of 10 years experience selling and servicing fire alarm systems.

3.04 SYSTEM TRAINING

A. Personalized instructions to the owner's representative shall be provided by a factory-trained representative of the equipment supplier.

3.05 WARRANTY

A. The equipment and wiring shall be warranted to be free from electrical and mechanical defects for a period of one (1) year commencing with start-up and owners beneficial use of any portion of the system. Warranty shall include all labor/travel time and parts.

END OF SECTION

SECTION 28 60 20

SMOKE DETECTORS

PART 1 - GENERAL

1.1 Work Included:

a. Furnish and install all equipment, accessories, and materials in accordance with these specifications and drawings to provide a complete and operating smoke detector system.

b. System Description – Self contained smoke detectors

c. Contractor shall furnish service and maintenance of smoke detectors for a period of one (1) year from the date of substantial completion. The warranty period shall begin at the time of completion or at the time the Owner first receives beneficial use, whichever comes first.

PART 2 - PRODUCTS

2.1 Acceptable Manufacturers

a. Equipment shall be self -contained smoke detectors, with sounder base, equipped with 120 volt supply and battery back-up. Smoke detectors in handicapped units shall be combination audible and visual with sounder base and flashing strobe light. Where specific makes and models are referred to, the intent is to establish a minimum level of performance and features. Equipment of another manufacturer may not be substituted. Approval for installation shall be subject to review and approval by the Architect.

b. All bids shall be based on the equipment as specified herein. The catalog numbers and model designations are that of the Gentex Company.

PART 3 - EXECUTION

3.1 Installation:

a. The contractor shall furnish and install all cable, equipment, miscellaneous parts and

accessories to make a complete and fully operational system as described herein and shown in the drawings.

b. Equipment shall be installed and wired in accordance with accepted engineering and installation practices. Only the highest degree of workmanship will be accepted.

c. Contractor shall be available to demonstrate the operation and use of the system to the Architect/Engineer and to the Owner's representatives if desired.

d. The Contractor's job foreman, in the presence of a representative of the Architect and the local Fire inspector shall operate every smoke detector to ensure proper operation.

END OF SECTION

SECTION 310000
EARTHWORK

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Protection, modification, or installation of utilities as sitework progresses with particular attention to grade changes and necessary staging or phasing of work.

B. Cutting, filling, and grading to required lines, dimensions, contours, and elevations for proposed improvements.

C. Scarifying, compacting, drying, dewatering and removal of unsuitable material to ensure proper preparation of areas for fills or proposed improvements.

1.02 RELATED SECTIONS

A. Section 312300 – Excavation, Backfill, and Compaction for Structures.

B. Section 312313 – Excavation, Backfill, and Compaction for Pavement.

C. Section 321123 – Aggregate Materials

D. Section 312513 – Slope Protection and Erosion Control

E. The "Foundation Subsurface Preparation" as shown on the Construction Drawings and/or the Architectural-Structural drawings and/or the "Report of Subsurface Exploration", whichever is more stringent if a conflict exists.

F. Construction Drawings and Report of Subsurface Exploration.

1.03 REFERENCE STANDARDS

A. American Society for testing and Materials (ASTM) latest edition.

1. D 698 Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^2)
   (600 kN.m/m^2).
2. D 1556 Density and Unit Weight of Soil In Place by the Sand-Cone Method.
3. D 1557 Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^2)
   (2,700 Kn.m/m^2).
4. D 2167 Density and Unit Weight of Soil In Place by the Rubber Balloon Method.
5. D 2216 Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures.
6. D 2487 Classification of Soils for Engineering Purposes.
7. D 2922 Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth).
8. D 3017 Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
9. D 4318 Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

B. American Association of State Highway and Transportation Officials (AASHTO) latest edition.

1. T 88 Particle Size Analysis of Soils.

1.04 QUALITY ASSURANCE

A. An independent testing laboratory, selected and paid for by Contractor, shall be retained to perform construction testing on site.

1. The independent testing laboratory shall prepare test reports that indicate test location, elevation data, and test results. Owner, Civil Engineering Consultant, and Contractor shall be provided with copies of reports within 96 hours of time that test was performed. In event that test performed fails to meet Specifications, Owner and Contractor shall be notified immediately by the independent testing laboratory.

2. Costs related to retesting due to failures shall be paid for by the Contractor at no additional expense to Owner. Contractor shall provide free access to site for testing activities.

1.05 SUBMITTALS

A. Submit 100-pound sample of each type of off-site fill material that is to be used at the site in air tight container(s) for the independent testing laboratory or submit gradation and certification of aggregate material that is to be used at the site to the independent testing laboratory for review.
B. Submit name of each material supplier and specific type and source of each material. Change in source throughout project requires approval of Engineer.
C. If fabrics or geogrids are to be used, design shall be submitted for approval to Engineer.
D. Submit Dewatering Plans upon request by Owner.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Excavated and re-used material for subsoil fill as specified herein.
B. Aggregate fill as specified in Section 321100.
C. Imported fill material approved by Geotechnical Engineer and specified herein.

2.02 EQUIPMENT

A. Transport off-site materials to project using well-maintained and operating vehicles. Once on site, transporting vehicles shall stay on designated haul roads and shall at no time endanger improvements by rutting, overloading, or pumping.

2.03 SOURCE QUALITY CONTROL

A. In areas to receive pavement, California Bearing Ratio (CBR) or Limerock Bearing Ratio (LBR) test shall be performed for each type of material that is imported from off-site.
B. Following tests shall be performed as part of construction testing requirements on each type of on-site or imported soil material used as compacted fill:
   1. Moisture and Density Relationship: ASTM D 698 (or ASTM D 1557).
   2. Mechanical Analysis: AASHTO T 88.
   3. Plasticity Index: ASTM D 4318.

PART 3 – EXECUTION

3.01 PREPARATION

A. Identify required lines, levels, contours, and datum.
B. Locate and identify existing utilities that are to remain and protect from damage.
C. Notify utility companies to remove or relocate utilities that are in conflict with proposed improvements.
D. Protect plant life, lawns, fences, existing structures, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

E. Protect benchmarks, property corners, and other survey monuments from damage or displacement. If marker needs to be removed it shall be referenced by licensed land surveyor and replaced, as necessary, by same.
F. Remove from site, material encountered in grading operations that, in opinion of the Geotechnical Engineer, is unsuitable or undesirable for backfilling, subgrade, or foundation purposes. Dispose of in a legal manner and a manner. Backfill areas with layers of suitable material and compact as specified herein.
G. Prior to placing fill in low areas, such as previously existing creeks, ponds, or lakes, perform following procedures:

1. Drain water out by gravity with ditch having flow line lower than lowest elevation in low area. If drainage cannot be performed by gravity ditch, use adequate pump to obtain the same results.
2. After drainage of low area is complete, remove mulch, mud, debris, and other unsuitable material by using acceptable equipment and methods that will keep natural soils underlying low areas dry and undisturbed.
3. If proposed for fill, muck, mud, and other materials removed from low areas shall be dried on-site by spreading in thin layers for observation by Geotechnical Engineer. Material shall be inspected and, if found to be suitable for use as fill material, shall be incorporated into lowest elevation of site filling operation, but not under building subgrade or within 10'-0" of perimeter of building subgrade, retaining wall subgrade or paving subgrade. If, after observation by Geotechnical Engineer, material is found to be unsuitable, unsuitable material shall be removed from site.

H. Dewatering:
1. General:
   a. Design and provide dewatering system using accepted and professional methods consistent with current industry practice to eliminate water entering the excavation under hydrostatic head from the bottom and/or sides. Design system to prevent differential hydrostatic head which would result in floating out soil particles in a manner termed as a "quick" or "boiling" condition. System shall not be dependent solely upon sumps and/or pumping water from within the excavation where differential head would result in a quick condition, which would continue to worsen the integrity of the excavation's stability.
   b. Provide dewatering system of sufficient size and capacity to prevent ground and surface water flow into the excavation and to allow all Work to be installed in a dry condition.
   c. Control, by acceptable means, all water regardless of source and be fully responsible for disposal of the water.
   d. Confine discharge piping and/or ditches to available easement or to additional easement obtained by Contractor. Provide necessary permits and/or additional easement at no additional cost to Owner.
   e. Control groundwater in a manner that preserves strength of foundation soils, does not cause instability or raveling of excavation slopes, and does not result in damage to existing structures. Where necessary to these purposes, lover water level in advance of excavation, utilizing wells, wellpoints, jet educators, or similar positive methods. The water level as measured by piezometers shall be maintained a minimum of 3 feet below prevailing excavation level.
   f. Commence dewatering prior to any appearance of water in excavation and continue until Work is complete to the extent that no damage results from hydrostatic pressure, flotation, or other causes.
   g. Open pumping with sumps and ditches shall be allowed, provided it does not result in boils, loss of fines, softening of the ground, or instability of slopes.
   h. Install wells and/or wellpoints, if required, with suitable screens and filters, so that continuous pumping of fines does not occur. Arrange discharge to facilitate collection of samples by the Owner. During normal pumping, and upon development of well(s), levels of fine sand or silt in the discharge water shall not exceed 5 ppm. Install sand tester on discharge of each pump during testing to verify that levels are not exceeded.

i. Control grading around excavations to prevent surface water from flowing into excavation areas.
j. No additional payment will be made for any supplemental measures to control seepage, groundwater, or artesian head.

2. Design:
   a. Contractor shall designate and obtain the services of a qualified dewatering specialist to provide dewatering plan as may be necessary to complete the Work.
   b. Contractor shall be responsible for the accuracy of the drawings, design data, and operational records required.
   c. Contractor shall be solely responsible for the design, installation, operation, maintenance, and any failure of any component of the system.
3. Damages:
   a. Contractor shall be responsible for and shall repair without cost to the Owner any damage to work in place, or other contractor's equipment, utilities, residences, highways, roads, railroads, private and municipal well systems, adjacent structures, natural resources, habitat, existing wells, and the excavation, including, damage to the bottom due to heave and including but not limited to, removal and pumping out of the excavated area that may result from Contractor's negligence, inadequate or improper design and operation of the dewatering system, and any mechanical or electrical failure of the dewatering system.
   b. Remove subgrade materials rendered unsuitable by excessive wetting and replace with approved backfill material at no additional cost to the Owner.
4. Maintaining Excavation in Dewatering Condition:
   a. Dewatering shall be a continuous operation. Interruptions due to power outages or any other reason will not be permitted.
   b. Continuously maintain excavation in a dry condition with positive dewatering methods during preparation of subgrade, installation of pipe, and construction of structures until the critical period of construction and/or backfill is completed to prevent damage of subgrade support, piping, structure, side slopes, or adjacent facilities from flotation or other hydrostatic pressure imbalance.
   c. Provide standby equipment on site, installed, wired, and available for immediate operation if required to maintain dewatering on a continuous basis in the event any part of the system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, perform such work as may be required to restore damaged structures and foundation soils at no additional cost to Owner.
   d. System maintenance shall include but not be limited to 24-hour supervision by personnel skilled in the operation, maintenance, and replacement of system components and any other work required to maintain excavation in dewatered condition.
5. System Removal:
   a. Remove dewatering equipment from the site, including related temporary electrical service.
   b. Wells shall be removed or cut off a minimum of 3 feet below final ground surface, capped, and abandoned in accordance with regulations by agencies having jurisdiction.

3.02 EXCAVATION FOR FILLING AND GRADING

A. Classification of Excavation: Contractor acknowledges that site has been investigated to determine type, quantity, quality, and character of excavation work to be performed. Excavation shall be considered unclassified excavation, except as indicated in the Contract Documents.

B. When performing grading operations during periods of wet weather, provide adequate dewatering, drainage and ground water management to control moisture of soils.

C. Shore, brace, and drain excavations as necessary to maintain excavation as safe, secure, and free of water at all times.

D. Excavated material containing rock or stone greater that 6-inches in largest dimension is unacceptable as fill within proposed building subgrade and paving subgrade.

E. Rock or stone less than 6-inches in largest dimension is acceptable as fill to within 24-inches of surface of proposed subgrade when mixed with suitable material.

F. Rock or stone less than 2-inches in largest dimension and mixed with suitable material is acceptable as fill within the upper 24-inches of proposed subgrade.

3.03 FILLING AND SUBGRADE PREPARATION

A. Fill areas to contours and elevations shown on Construction Drawings with unfrozen materials.

B. Place fill in continuous lifts specified in Geotechnical Report.

C. Refer to Section 312300 and Geotechnical Report for filling requirements for structures.

D. Refer to Section 312313 and Geotechnical Report for filling requirements for pavements.

E. Areas exposed by excavation or stripping and on which subgrade preparations are to be performed shall be scarified to minimum depth of 8-inches and compacted as per the geotechnical report included herein.

F. Fill materials used in preparation of subgrade shall be placed as per the geotechnical report included herein.

G. Material imported from off-site shall have CBR value equal to or above pavement design subgrade CBR value indicated in the geotechnical report.

3.04 MAINTENANCE OF SUBGRADE

A. Verify finished subgrades to ensure proper elevation and conditions for construction above subgrade.

B. Protect subgrade from excessive wheel loading during construction, including concrete trucks, dump trucks, and other construction equipment.

C. Remove areas of finished subgrade found to have insufficient compaction density to depth necessary and replace in manner that will comply with compaction requirements by use of material equal to or better than best subgrade material on site. Surface of subgrade after compaction shall be hard, uniform, smooth, stable, and true to grade and cross-section.

3.05 BORROW AND SPOIL SITES

A. Contractor shall be responsible for compliance with NPDES and local erosion control permitting requirements for any and all off-site, disturbed spoil and borrow areas. Upon completion of spoil and/or borrow operations, clean up spoil and/or borrow areas in a neat and reasonable manner to the satisfaction of property owner, Owner, and Civil Engineering Consultant.

3.06 RIP-RAP

A. This work shall consist of furnishing and setting or placing rubble stone, crushed stone, concrete blocks, sacked sand-cement or machined rip-rap. Slope pavement shall consist of

the construction of a reinforced concrete mat on prepared slopes. Construction shall be in reasonable close conformity to the lines, grades, dimensions, typical details and sizes shown on the drawings or as directed by the Engineer.

B. All materials used in this construction, in addition to the general requirements of these Specifications, unless otherwise stipulated, shall conform to the following:
   1. Rip-rap and slope pavement shall conform to Subsection 709 of the Tennessee Department of Transportation, Standard Specifications for Road and Bridge Construction, 2015 or latest revisions.

3.07 FINISH GRADING

A. Grade areas where finish grade elevations or contours are indicated on Construction Drawings, other than paved areas and buildings, including excavated areas, filled and transition areas, and landscaped areas. Graded areas shall be uniform and smooth, free from rock, debris, or irregular surface changes. Finished subgrade surface shall not be more than 0.10-feet above or below established finished subgrade elevation. Ground surfaces shall vary uniformly between indicated elevations. Grade finished ditches to allow for proper drainage without ponding and in manner that will minimize erosion potential.

B. Correct settled and eroded areas within 1 year after date of completion at no additional expense to Owner. Bring grades to proper elevation. Replant or replace grass, shrubs, bushes, or other vegetation that appears dead, dying, or disturbed by construction activities. Refer to Section 312513 for slope protection and erosion control.

3.08 FIELD QUALITY CONTROL

A. Field density tests for in-place materials shall be performed as part of construction testing requirements according to one of the following standards:
   1. Sand-Cone Method: ASTM D 1556.
   2. Balloon Method: ASTM D 2167.
   3. Nuclear Method: ASTM D 2922 (Method B-Direct Transmission).

B. Perform density test as follows:
   1. Building Subgrade Areas, Including 10'-0" Outside of Exterior Building Lines: In cut areas, not less than 1 compaction test for every 2,500 sq. ft. In fill areas, same rate of testing for each 6-inch lift, measured loose.
   2. Areas of Construction Exclusive of Building Subgrade Areas: In cut areas, not less than 1 compaction test for every 10,000 sq. ft. In fill areas, same rate of testing for each 6-inch lift, measured loose.

C. Corrective measures for non-complying compaction:
   1. Remove and recompact deficient areas until proper compaction is obtained at no additional expense to Owner.

END OF SECTION

SECTION 311000
SITE CLEARING

PART 1- GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

A. Extent of site clearing is shown on drawings.

1.03 JOB CONDITIONS

A. Traffic: Conduct site clearing operations to insure minimum interference with roads, streets, walks and other adjacent occupied or used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.

B. Protection of Existing Improvements: Provide protections necessary to prevent damage to existing improvements indicated to remain in place. Protect improvements on adjoining properties and on Owner's property. Restore damaged improvements to their original condition, as acceptable to parties having jurisdiction.

C. Protection of Existing Trees and Vegetation: Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary guards to protect trees and vegetation to be left standing.

1. Provide protection for roots over 1 ½" diameter cutting during construction operations. Coat cut faces with emulsified asphalt, or other acceptable coating, formulated for use on damaged plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out; cover with earth as soon as possible.
2. Repair or replace trees and vegetation indicated to remain which are damaged by construction operations.
3. Water trees and other vegetation to remain within limits of contract work as required to maintain their health during course of construction operations.

PART 2 – PRODUCTS

Not applicable.

PART 3 – EXECUTION

3.01 GENERAL

A. Remove trees, shrubs, grass and other vegetation, improvements, or obstructions interfering with installation of new construction. Remove such items elsewhere on site or premises as specifically indicated. Removal includes digging out stumps and roots.

1. Carefully and cleanly cut roots and branches of trees indicated to be left standing, where such roots and branches obstruct new construction. Use only hand methods for clearing and grubbing inside drip line of trees indicated to be left standing.

3.02 TOPSOIL

A. Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4". Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2" in diameter, and without weeds, roots and other objectionable material.

1. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.

2. Where trees are indicated to be left standing, stop topsoil stripping a sufficient distance to prevent damage to main root system.
3. Stockpile topsoil in storage piles. Construction storage piles to freely drain surface water. Dress stockpiled soil in accordance with section Stormwater Pollution Prevention Plan.

3.03 REMOVAL OF IMPROVEMENTS

A. Remove existing above-grade and below-grade improvements necessary to permit construction. Abandonment or removal of certain underground pipe or conduits may be shown on mechanical or electrical drawings, and is included under work of those sections. Removal of abandoned underground piping or conduit interfering with construction is included under this section.

3.04 DISPOSAL OF WASTE MATERIALS

A. Dispose of materials in a legal manner.

END OF SECTION

SECTION 312219
FINISH GRADING

PART 1 – GENERAL

1.01 The work called for by this section shall include, but not necessarily be limited to, finish grading and the spreading and shaping of topsoil to the finished contour elevations indicated by the drawings.

1.02 Refer to other sections for work related to that specified under this heading. Coordinate this work with that specified by other sections for timely execution.

PART 2 – PRODUCTS

2.01 TOPSOIL

A. Premium Mix Soil. Soil pH. 6.6-7.0. Ready to use screened mixture of sandy loam and compost, high organic matter and essential nutrients included are as follows: phosphorus, potassium, calcium and magnesium.

PART 3 – EXECUTION

3.01 Do not begin work until the earth is dry enough to be tillable.

3.02 Inspect subgrades to see that they generally conform to the standards called for elsewhere in these specifications, particularly with regard to the approximate depths required for the work. After work is completed, inspect it to ensure that all finish grading complies with design requirements.

3.03 Place finished grade stakes wherever necessary to bring the work accurately to the elevations required by the drawings.

3.04 Finish grade all areas outside the building line to the depths Required for the work as follows:

3.05 Grade uniformly with rounded surfaces at the tops and bottom of abrupt changes of plans.

A. Hand grade steep slopes and areas that are inaccessible for machine work.
B. Protect graded areas from undue erosion, and repair and re-grade areas where erosion does occur.
C. Refill areas where noticeable settlement has occurred.
D. Finish grade areas that are to receive topsoil up to 4 inches below the finished contour elevations called for by the drawings or, over rock, to 12 inches below these elevations.

3.06 Place topsoil uniformly over disturbed areas that do not receive other work as follows.

A. Obtain approval of the finish grading from the A/E before starting to place topsoil.
B. Scarify subgrade to a depth of 6 inches.
C. Place the topsoil to a depth of 4 inches when lightly rolled or, on rock, to a depth of 12 inches.
D. Level the topsoil so that it slopes uniformly and has no water pockets.
E. Carefully rake the topsoil by hand to remove all clods, roots, sticks, stones over 1 inch in diameter, and other foreign materials from the surface.

3.07 Dispose of excess excavated materials and debris away from the site in a legal manner.

END OF SECTION

SECTION 312300
EXCAVATION AND FILL

PART 1- GENERAL

1.01 SECTION INCLUDES

A. Excavation to line, grade, and configuration as shown on Construction Drawings for proposed structures and future expansion areas.
B. Fill to line, grade, and configuration as shown on Construction Drawings for proposed structures and future expansion areas.
C. Compacting for materials in acceptable manner as specified herein.

1.02 RELATED SECTIONS

A. Section 311123 – Aggregate Material
B. The "Foundation Subsurface Preparation" as shown on the Construction Drawings and/or the Architectural-structural drawings and/or the "Report of Subsurface Exploration", whichever is more stringent.
C. Construction drawings and Report of Subsurface Exploration.

1.03 REFERENCE STANDARDS

A. See Section 310000

1.04 QUALITY ASSURANCE

A. An independent testing laboratory, selected and paid for by Contractor, shall be retained to perform construction testing on filling operations and subgrade analysis as specified in Section 310000 and as specified herein.

1.05 SUBMITTALS

A. Shop drawings or details pertaining to excavating and filling for structures are not required unless otherwise shown on Construction Drawings or if contrary procedures to Contract Documents are proposed.
B. Submit 100-pound sample of each type of off-site fill material that is to be used in backfilling in air-tight container(s) to the independent testing laboratory or submit gradation and certification of aggregate material that is to be used at the site to the independent testing laboratory for review.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Fill material from on-site as specified in Section 310000 and approved by Geotechnical Engineer.
B. Fill material from off-site as specified in Section 310000 and approved by Geotechnical Engineer.
C. Aggregate material as specified in Section 321123.

2.02 EQUIPMENT

A. Transport off-site materials to the project using well-maintained and operating vehicles. Once on site, transporting vehicles shall stay on designated haul roads and shall at no time endanger improvements by rutting, overloading, or pumping.

PART 3 – EXECUTION

3.01 PREPARATION

A. Identify lines, elevations, and grades necessary to construct building subgrades as shown on Construction Drawings.

B. Protect benchmarks, property corners, and other survey monuments from damage or displacement. If marker needs to be removed it shall be referenced by licensed land surveyor and replaced, as necessary, by same.
C. Locate and identify utilities that have previously been installed and protect from damage.
D. Locate and identify existing utilities that are to remain and protect from damage.
E. Overexcavate and properly prepare areas of subgrade that are not capable of supporting proposed structures. Stabilize these areas by using acceptable geotextile fabrics or aggregate materials placed and compacted.

3.02 EXCAVATION

A. Excavate building areas to line and grade as shown on Construction Drawings being careful not to overexcavate beyond elevations needed for building subgrades.
B. Place suitable excavated material into project fill areas as specified in Section 312300.
C. Unsuitable excavated material is to be disposed of in a legal manner.
D. Perform excavation using capable, well-maintained equipment and methods acceptable to Owner and local governing agencies.

3.03 FILLING AND SUBGRADE PREPARATION

A. Building area subgrade pad shall be that portion of site directly beneath and 10-feet beyond building and appurtenances, including limits of future building expansion areas as shown on Construction Drawings.
B. Prepare building area subgrade pad in strict accordance with “Foundation Subsurface Preparation” as shown on the Construction Drawings and/or the architectural-structural drawings, whichever is more stringent. Rock larger than 6-in. shall not be part of building subgrade fill.
C. Areas exposed by excavation or stripping and on which building subgrade preparations are to be performed shall be scarified to a minimum depth of 8-inches and compacted as per the geotechnical report included herein.
Place fill materials used in preparation of subgrade as per the geotechnical report included herein.

3.04 COMPACTION

A. Maintain optimum moisture content as specified above of fill materials to attain required compaction density.
B. Test materials in accordance with Section 310000.
C. Corrective measures for non-compaction: Remove and recompact deficient areas until proper compaction is obtained at no additional expense to Owner.

3.05 MAINTENANCE OF SUBGRADE

A. Verify finished subgrades to ensure proper elevation and conditions for construction above subgrade.
B. Protect subgrade from excessive wheel loading during construction, including concrete trucks, dump trucks, and other construction equipment.
C. Remove areas of finished subgrade found to have insufficient compaction density to depth necessary and replace in manner that will comply with compaction requirements by use of materials equal to or better than best subgrade material on site. Surface of subgrade after compaction shall be hard, uniform, smooth, stable, and true to grade and cross-section.

3.06 FINISH GRADING

A. Finish grading shall be in accordance with Section 310000 and as more specifically specified herein.

B. Check grading of building subgrades by string line from grade stakes (blue tops) set at not more than 50-foot centers. Tolerances of 0.10-feet, more or less, will be permitted. Contractor to provide engineering and field staking necessary for verification of lines, grades, and elevations.

END OF SECTION

SECTION 312313
EXCAVATION, BACKFILL AND COMPACTION FOR PAVEMENT

PART 1- GENERAL

1.01 SECTION INCLUDES

A. Excavation to line, grade, and configuration as shown on Construction Drawings for proposed and future pavement areas.

B. Fill to line, grade, and configuration as shown on Construction Drawings for proposed and future pavement areas.

C. Compacting fill materials in acceptable manner as specified herein.

1.02 RELATED SECTIONS

A. Section 310000 – Earthwork

B. Section 321123 – Aggregate Materials

C. Construction Drawings and Report of Subsurface Exploration.

1.03 REFERENCE STANDARDS

A. See Section 310000.

1.04 QUALITY ASSURANCE

A. Independent Testing Laboratory, selected and paid by Contractor, shall be retained to perform construction testing on filling operations and subgrade analysis as specified in Section 310000 and as specified herein.

1.05 SUBMITTALS

A. Shop drawings or details pertaining to excavating and filling for pavements are not required unless otherwise shown on Construction Drawings or if contrary procedures to Construction Documents are proposed.

B. Submit 100-pound sample of each type of off-site fill material that is to be used in backfilling in air-tight container to independent testing laboratory or submit gradation and certification of aggregate material that is to be used to independent testing laboratory for review.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Fill material from on-site as specified in Section 310000 and approved by Geotechnical Engineer.

B. Fill material from off-site as specified in Section 310000 and approved by Geotechnical Engineer.

C. Aggregate material as specified in Section 321123.

PART 3 – EXECUTION

3.01 PREPARATION

A. Identify lines, elevations, and grades necessary to construct pavements, curb, curb and gutter, bases, sidewalk, and roadways as shown on Construction Drawings.

B. Protect benchmarks, property corners, and other survey monuments from damage or displacement. If marker needs to be removed it shall be referenced by licensed land surveyor and replaced, as necessary, by same.

C. Locate and identify site utilities that have previously been installed and protect from damage.

D. Locate and identify existing utilities that are to remain and protect from damage.

E. Overexcavate and properly prepare areas of subgrade that are not capable of supporting proposed systems. Stabilize these areas by using acceptable geotextile fabrics or aggregate material placed and compacted as described in Soils Report.

3.02 EXCAVATION

A. Excavate roadway and pavement areas to line and grade as shown on Construction Drawings.
B. Place suitable material into project fill areas as specified in Section 310000.
C. Unsuitable excavated material is to be disposed of in a legal manner.
D. Perform excavation using capable, well-maintained equipment and methods acceptable to Owner and local governing agencies.

3.03 FILLING AND SUBGRADE PREPARATION

A. Areas exposed by excavation or stripping and on which subgrade preparations for paving are to be performed, including future pavement areas, shall be scarified to minimum depth of 8-inches and compacted and proof roll as per the geotechnical report included herein. Excavate and recompact areas of failure as specified herein. Continual failure areas shall be stabilized in accordance with Section 312300 at no additional cost to Owner.
B. Place fill materials used in preparation of the subgrade in lifts or layers not to exceed 6-inches loose measure and compact as per the geotechnical report included herein.
C. Fill Material imported from off-site or fill material removed from onsite cut areas shall have CBR value equal to or greater than pavement design subgrade CBR value indicated in geotechnical report.

3.04 COMPACTION

A. Maintain optimum moisture content of fill materials as specified herein to attain required compaction density.
B. Test materials in accordance with Section 310000.
C. Corrective measures for non-complying compaction: Remove and recompact deficient areas until proper compaction is obtained at no additional expense to Owner.

3.05 MAINTENANCE OF SUBGRADE

A. Verify finished subgrades to ensure proper elevation and conditions for construction above subgrade.
B. Protect subgrade from excessive wheel loading during construction including concrete trucks, dump trucks, and other construction equipment.
C. Remove areas of finished subgrade found to have insufficient compaction density to depth necessary and replace in manner that will comply with compaction requirements by use of material equal to or better than best subgrade material on site. Surface of subgrade after compaction shall be hard, uniform, smooth, stable, and true to grade and cross-section.

3.06 FINISH GRADING

A. Finish grading shall be in accordance with Section 312219 and as specified herein.
B. Check grading of paving areas by string line from grade stakes (blue tops) set at not more than 50-foot centers. Tolerances of 0.10-foot, more or less, will be permitted. Contractor is to provide engineering and field staking necessary for verification of lines, grades, and elevations.

END OF SECTION

SECTION 312316.13
FACILITY UTILITIES EXCAVATING AND BACKFILLING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Excavate and backfill trenches for all piping except irrigation system.

1.02 RELATED WORK

A. Section 014000 - Quality Control
   1. Testing Laboratory Services.
B. Section 310000 - Earthwork.
C. Section 334000 - Storm Drainage.
D. Section 334900 - Storm Drainage Structures

1.03 QUALITY ASSURANCE

A. Comply with requirements of local Department of Public Works.
B. Obtain required permits and notices.

1.04 PROTECTION

A. Shore and brace excavations to prevent caving as required.
B. Provide surface drainage to keep excavations clear of water. Pump if required.
C. Protect all existing on-site utilities, and City utilities at project site property lines.

1.05 COORDINATION

A. Coordinate with other trades affected by this work.
B. Schedule trench excavations so that pipes passing under foundations are in place and trenches are properly backfilled before foundations are placed.

PART 2 - PRODUCTS

2.01 AGGREGATES

A. Crushed stone or clean natural gravel: ASTM D448, No. 6
B. Sand: ASTM C144.

2.02 EARTH FILL

A. Earth: Clean selected clay, silty clay, or sandy clay.

2.03 POLYETHYLENE LINER

A. Black polyethylene, 6 mils thick, minimum, or approved equal.

2.04 MULCH

A. Clean coarse hay.

PART 3 - EXECUTION

3.01 EXCAVATING ROCK

A. When rock is encountered which cannot be removed with backhoe and powered shovel, obtain instructions from Geotechnical Engineer before proceeding.
B. In excavated areas, backfill with aggregate and thoroughly compact.

3.02 EXCAVATING TRENCHES

A. Trenches may be excavated with trenching machines and backhoes, except as otherwise specified below.
B. Unless otherwise indicated, excavate trenches outside of building to a depth which will allow placement of pipes below frost line, but in no case less than 2'-0" cover.
C. Trenches which cross foundations inside of building, excavate to a depth which will allow placement of top pipes to hold pitch and meet connection points.

D. Service lines inside of building serving as distribution lines to individual fixtures may be placed in aggregate fill below concrete slab-on-grade, as specified below. Electric conduit below slabs-on-grade may be similarly placed.
E. Excavate trenches for bell hubbed pipe wide enough to allow for proper jointing, bedding, and visual inspection of at least the top half of pipe.
   1. Excavate the bottom 6 inches of trenches with hand tools and make uniformly smooth. Scoop out bell holes so that the barrel of each length of pipe is uniformly supported.
   2. Excavate trenches in rock 6 inches and backfill with sand to allow pipe to lay on sand bed.
   3. Provide the following slopes on sewer and drain lines unless shown otherwise:
      a. Inside of building: 1/4" to 1'-0".
      b. Outside of building: 1/8" to 1'-0".
F. Earth Trenches for Copper, PVC, and Galvanized Pipe, and Electrical Conduit shall be excavated to a depth of 6 inches below bottoms of pipes in final position and backfill with sand. Tamp sand to settle it and provide smooth surface to uniformly support pipe. Trenches may be narrow provided pipes can be properly bedded, connected, and inspected.
G. Sewer and Water Line Trenches:
   1. Provide separate trenches. Allow at least 10 feet of undisturbed earth or controlled fill between sewer and waterlines.
   2. Where sewer and waterlines are within 10 feet of each other, and where they cross, place sewer lines at least 18 inches below water lines.

3.03 PLACING PIPES IN FILL AGGREGATE

A. Cast iron, vitreous clay, and concrete pipe may be placed directly into trenches furrowed out in fill aggregate, but tops of piping shall be below bottoms of concrete slabs.
B. Where copper, PVC, corrugated metal pipe, or black pipe and electrical conduit are placed in fill, furrow out trenches to a depth which will allow tops of pipes to be below bottoms of concrete slabs after the following bedding is done. Line trenches in fill with a double layer of polyethylene sheeting; place at least 3" of sand on top of felt and tamp it smooth. After pipe is installed, back-fill over top of pipe with sand at least 3" deep, backfill to level of tip of fill.

3.04 BACKFILLING TRENCHES

A. Do not backfill utility trenches until pipes are installed, tested and approved.

3.05 PIPING OUTSIDE OF BUILDING

A. Cast iron, vitreous clay, corrugated pipe, and concrete pipe: Backfill with aggregate to 6" below adjacent grades in areas designated as lawns or plantings and place a thin dense layer of hay and finish backfilling with earth fill. Areas paved or covered by there construction shall be back-filled with aggregate to level of adjacent grades. In placing aggregate fills, work along sides and under bottom half to fully support pipes; then place fill on top of pipes in 8" lifts and tamp each lift for compaction.
B. Copper, PVC or black pipe and electrical conduit: Backfill with sand over tops of pipes. Use hand tools to backfill and compact sand along sides and bottoms of pipes to ensure their support. After sand has been tamped, backfill with aggregate and earth (as specified above for cast iron pipe) in areas designated as lawns or planted. In paved areas backfill as specified above for cast iron pipe.

3.06 BACKFILLING PITS

A. Do not backfill pits until installed items have been completed and tested.
B. Concrete masonry and cast iron items: Backfill with coarse aggregate. Place aggregate in one foot layers and compact each layer after placing. Where items are placed in lawn areas, fill with aggregate to one foot below adjacent grades, cover with straw or paper, and finish

backfilling to grade with fill earth. Tamp and compact earth fill to the same density as adjacent grade materials. Where items are placed in areas covered by paving or other hard surfaced construction, fill with coarse aggregate to existing grades.

3.07 CLEAN-UP

A. After other work of this Section is completed, leave area clean and free of debris.

B. Remove excess earth and rock remaining after backfill is completed from job site.

END OF SECTION

SECTION 312513
SLOPE PROTECTION AND EROSION CONTROL

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Installation of temporary and permanent erosion control systems.
B. Installation of temporary and permanent slope protection systems.

1.02 RELATED SECTIONS

A. Section 310000 – Earthwork
B. Construction Drawings
C. Subsection 209 TDOT, standard specifications
D. Tennessee Department of Environment and Conservation Erosion and Sediment Control Handbook

1.03 ENVIRONMENTAL REQUIREMENTS

A. Protect adjacent properties and water resources from erosion and sediment damage throughout life of contract.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Quick growing grasses as specified in Construction Drawings.
B. Hay or straw bales as specified in Construction Drawings.
C. Fencing for siltation control as specified on Construction Drawings.
D. Curlex blankets by American Excelsior Company or approved equal.
E. Bale stakes as specified in Construction Drawings.
F. Temporary mulches such as loose hay, straw, netting, wood cellulose, or agricultural silage.
G. Fence stakes shall be as specified in Construction Drawings.

PART 3 – EXECUTION

3.01 PREPARATION

A. Review Construction Drawings and Storm Water Pollution Prevention Plan.
B. Deficiencies or changes on Construction Drawings or Storm Water Pollution Prevention Plan as it is applied to current conditions shall be brought to the attention of Engineer for remedial action.

3.02 EROSION CONTROL AND SLOPE PROTECTION IMPLEMENTATION

A. Place erosion control systems in accordance with Construction Drawings and Storm Water Pollution Prevention Plan (SWPPP) or as may be dictated by site conditions in order to maintain the intent of the specifications and permits at no additional cost to Owner.
B. Engineer has authority to limit surface area of erodible earth material exposed by cleaning and grubbing, excavation, borrow and embankment operations and to direct Contractor to provide immediate permanent or temporary pollution control measures. Contractor will be required to incorporate permanent erosion control features into project at earliest practical time to minimize need for temporary controls. Permanently seed and mulch cut slopes as excavation proceeds to extent considered desirable and practical.
C. Maintain temporary erosion control systems as directed by Engineer or governing authorities to control siltation during life of contract. Contractor shall respond to maintenance or additional work ordered by Engineer or governing authorities within 48 hours or sooner if required.

D. Slopes that erode easily or that will not be graded for a period of 14 days or more shall be temporarily seeded as work progresses with Kentucky 31 Fescue application unless otherwise specified on the Construction Drawings.

E. In the event that sitework on this project will disturb one or more acres; the Contractor shall not begin construction without submitting a "Notice of Intent" as required by the Tennessee General Permit No TNR 10-0000, Construction General Permit (TNCGP) for Storm Water Discharges from Construction Activities. No construction activity shall begin until a "Notice of Coverage" (NOC) is received from the Tennessee Department of Environment and Conservation.

F. The contractor shall be totally responsible for conducting storm water management practices in accordance with the TNCGP, the Tennessee Erosion & Sediment Control Handbook, and the WWPPP and for enforcement action taken by or imposed by Federal or State agencies, including the cost of fines, construction delays, and remedial action resulting from the Contractor's failure to comply with the provisions of the TNCGP.

END OF SECTION

SECTION 31 31 16

TERMITE CONTROL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Soil Treatment for Termite Control.

1.2 RELATED SECTIONS

A. Section 017700 – Closeout Procedures.

B. Section 033000 – Cast-In-Place Concrete.

C. Section 310000 – Earthwork.

1.3 QUALITY ASSURANCE

A. Applicator Qualifications:
   1. Company specializing in soil treatment for termite control with five years experience.
   2. Licensed by Tennessee Department of Agriculture.

1.4 SUBMITTALS

A. Submit product data.
   1. Indicate products to be used, composition by percentage, dilution schedule, and intended application rate.

B. Submit under provisions of Section 013300.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with recommendations of soil treatment product manufacturer.

1.6 PROJECT CONDITIONS

A. Apply product not more than 12 hours prior to installation of vapor barrier under slab-on-grade or finish grading outside foundation walls.

B. Coordinate soil treatment at foundation perimeter with finish grading and landscaping work to avoid disturbance of treated soil.

C. Do not apply soil treatment to frozen or excessively wet soils or during inclement weather.

1.7 WARRANTY

A. Furnish written warranty certifying that applied soil treatment will prevent infestation of subterranean termites, and that if subterranean termite activity is discovered during warranty period, Contractor will re-treat soil and repair or replace damage caused by termite infestation.
   1. Warranty for a period of 5 years from date of treatment.
   2. Warranty form to be signed by Applicator and Contractor.

B. Submit under provisions of Section 017700.

PART 2 - PRODUCTS

2.1 SOIL TREATMENT PRODUCTS

A. Acceptable products:
   1. Chloropyrifos (Tradename Dursban TC), 1.0 percent in water emulsion.
   2. Permathrin (Tradename Dragnet, Torpedo), 0.5 percent in water emulsion.

B. Submit other manufacturers' equivalents under the provisions of Section 016000.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Ensure that vapor barrier will be installed by others within recommended time period following soil treatment.

3.2 PREPARATION

A. Remove foreign matter which could decrease effectiveness of treatment on areas to be treated.

3.3 APPLICATION

A. Apply products to soil at the following rates:

1. Under Slab on Grade: 1.5 gal. Per 10 sq. ft.
2. Along Both Sides of Foundation Wall: 1 gal. Per 2.5 lin. ft., for each foot of depth from grade footing.
3. Voids of Unit Masonry Foundation Wall: 2 gal. Per 10 lin.ft., poured directly into void.
4. Soil Within 10 Feet of Building Perimeter: 1 gal. Per 2.5 lin. ft.
5. Apply extra treatment to structure penetrations, pipe, ducts, and other soil penetrations.

B. Apply as a coarse spray to ensure uniform distribution.

3.4 RETREATMENT

A. Retreat disturbed treated soil.

B. Use same products as for original treatment.

END OF SECTION

SECTION 321100
PAVING BASE COURSE

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Construction of granular base for asphaltic concrete and Portland cement concrete paving.
B. Construction of sand/shell base for asphaltic concrete and Portland cement concrete paving.
C. Construction of full depth asphalt base for asphaltic concrete paving.
D. Construction hot-mix sand asphalt base for asphaltic concrete paving.
E. Construction of soil cement stabilized base for asphaltic concrete and Portland cement concrete paving.

1.02 RELATED SECTIONS,

A. Section 310000 – Earthwork
B. Section 312313 – Excavation, Backfill, and Compaction for Pavement
C. Section 321123 – Aggregate Materials
D. Section 321600 – Curbs and Sidewalks
E. State Highway Department Standard Specifications
F. Construction Drawings

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM) latest edition.
   1. D 698 Laboratory Compaction Characteristics of Soil Using Standard Effort. (12,400 ft-lbf/ft^2) (600 kN.m/m^2)
   2. D 1556 Density and Unit Weight of Soil In Place by the Sand-Cone Method.
   3. D 1557Laboratory Compaction Characteristics of Soil Using Modified Effort. (56,000 ft-lbf/ft^2) (2,700 kN.m/m^2)
   4. D 2167 Density and Unit Weight of Soil In Place by the Rubber Balloon Method.
   5. D 2216 Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures.
   6. D 2487 Classification of Soils for Engineering Purposes.
   7. D 2922 Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth)
   8. D 3017 Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
   9. D 4318 Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
B. American Association of State Highway and Transportation Official (AASHTO) latest edition
   1. T88 Particle Size Analysis of Soils

1.04 QUALITY ASSURANCE

A. An independent testing laboratory selected and paid by Contractor, will be retained to perform construction testing of in-place base course for compliance with requirements for thickness, compaction, density, and tolerances. Paving base course tolerances shall be verified by rod and level readings on not more than 50-foot centers to be not more than 0.05 feet above design elevation which will allow for paving thickness as shown on Construction Drawings. Contractor shall provide instruments and suitable benchmark.

PART 2 – PRODUCTS

2.01 FILL MATERIALS

A. Submit materials certificate to the independent testing laboratory which is signed by materials producer and Contractor, certifying that materials comply with, or exceed, requirements specified herein.

2.01 SOURCE QUALITY CONTROL

A. Following test will be performed on each type of material used as base course material:
   1. Moisture and Density Relationship: ASTM D 698 (or ASTM D 1557).
   2. Mechanical Analysis: AASHTO T 88.
   3. Plasticity Index: ASTM D 4318.
   4. Base material thickness: Perform 1 test for each 20,000 sq. ft. of in-place base material area.
   5. Base material compaction: Perform 1 test in each lift for each 20,000 sq. ft. of in-place base material area.
   6. Test each source of base material for compliance with state highway department specifications.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Contractor shall verify to the Owner in writing that the subgrade has been inspected, tested, and gradients and elevations are correct, dry, and properly prepared in accordance with the requirements of applicable state highway department specifications section(s) referred to or noted on the Construction Drawings.

3.02 CONSTRUCTION

A. Construction shall meet or exceed requirements of this Section and applicable state highway department specifications section(s) referred to or noted on the Construction Drawings which pertain to aggregate base course design, materials, preparation, and execution. Materials shall be as indicated on Construction Drawings and shall comply with state highway department specifications regarding source, quality, gradation, liquid limit, plasticity index, and mix proportioning.

3.03 FIELD QUALITY CONTROL

A. Field density tests for in-place materials shall be performed in accordance with one of following standards:
   1. Sand-Cone Method: ASTM D 1556.
   2. Balloon Method: ASTM D 2167.
   3. Nuclear Method: ASTM D 2922 (Method B-Direct Transmission).

B. The independent testing laboratory will prepare reports that indicate test location, elevation data, and test results. Owner and Contractor shall be provided with copies of the reports within 96 hours of the time the test was performed. In the event that the test results show failure to meet any of the Specifications; Owner and Contractor will be notified immediately by the independent testing laboratory.

C. Costs related to retesting due to failures shall be paid for by Contractor at no additional expense to Owner. Contractor shall provide free access to the site for testing activities.

END OF SECTION

SECTION 321123
AGGREGATE MATERIALS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Aggregate materials for use as specified in other sections.

1.02 RELATED SECTIONS

A. Section 310000 – Earthwork
B. Section 312300 – Excavation, Backfill, and Compaction for Structures
C. Section 312313 – Excavation, Backfill, and Compaction for Pavement
D. Section 312513 – Slope Protection and Erosion Control
E. Construction Drawings and Report of Subsurface Exploration

1.03 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM) latest edition.
   1. D 698 Laboratory Compaction Characteristics of Soil Using Standard Effort. (12,400 ft-lbf/ft^2)(600 kN.m/m^2)
   2. D 1556 Density and Unit Weight of Soil In Place by the Sand-Cone Method.
   3. D 1557 Laboratory Compaction Characteristics of Soil Using Modified Effort. (56,000 ft-lbf/ft^2) (2,700 kN.m/m^2)
   4. D 2167 Density and Unit Weight of Soil In Place by the Rubber Balloon Method.
   5. D 2216 Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures.
   6. D 2487 Classification of Soils for Engineering Purposes.
   7. D 2922 Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth)
   8. D 3017 Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
   9. D 4318 Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

B. American Association of State Highway and Transportation Officials (AASHTO) latest edition.
   1. TT 88 Particle Size Analysis of Soils

1.04 QUALITY ASSURANCE

A. Tests and analysis of aggregate materials will be performed in accordance with ASTM and AASHTO procedures specified herein.

1.05 SUBMITTALS

A. Submit 100-pound sample of each aggregate or mixture that is to be incorporated into project in air-tight containers to the independent testing laboratory or submit gradation and certification of aggregate material that is to be incorporated into project to the Engineer for review.
B. Submit name of each material supplier and specific type and source of each material. Any change in source requires approval of Engineer.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Construction and materials shall meet or exceed requirements of this Section and applicable state highway department specifications section(s) referred to or noted on the Construction Drawings which pertain to paving base course design, materials, preparation, and execution. Materials shall be as indicated on Construction Drawings and shall comply with state highway department specifications regarding source, quality, gradation, liquid limit, plasticity index, and mix proportioning.

2.02 EQUIPMENT

A. Transport off-site materials to project using well-maintained and operating vehicles. Once on site, transporting vehicles shall stay on designated haul roads and shall at no time endanger any improvements by rutting, overloading, or pumping.

PART 3 – EXECUTION

3.01 STOCKPILING

A. Stockpile on-site at locations indicated by Owner in such manner that there will be no standing water or mixing with other materials.

3.02 BORROW AND SPOIL SITES

A. Upon completion of borrow and/or soil operations, clean up borrow and/or soil areas as indicated on Construction Drawings in neat and reasonable manner to satisfaction of property owner and Owner.

END OF SECTION

SECTION 321216
ASPHALT CONCRETE PAVING

PART 1- GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

A. Extent of Asphalt concrete paving work is shown on the drawings.

B. Clearing, earthwork and prepared aggregate subbase is specified in earthwork sections.

1.03 SUBMITTALS

A. Material Certificates: Provide copies of materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

1.04 QUALITY ASSURANCE

A. Codes and Standards: Comply with "Standard Specifications for Road and Bridge Construction" by the Tennessee Department of Transportation, latest edition, and with local governing regulations if more stringent than herein specified.

1.05 JOB CONDITIONS

A. Weather Limitations: Apply prime and tack coats when ambient temperature is above 50 degrees F. (10 degrees C.), and when temperature has not been below 35 degrees F. (1 degree C.) for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture.

B. Construct asphalt concrete surface course when atmospheric temperature is above 40 degrees F. (4 degrees C.) and when base is dry. Base course may be placed when air temperature is above 30 degrees F. (-1 degree C.) and rising.

C. Grade Control: Establish and maintain required grades and elevations.

PART TWO - PRODUCTS

2.01 MATERIALS

A. General: Use locally available materials and gradations, which exhibit a satisfactory record of previous installations.

B. Materials shall meet or exceed requirements of this Section and applicable state highway department specifications section(s) referred to or noted on the Construction Drawings which pertain to paving design, materials, preparation, and execution. Materials shall be as indicated on Construction Drawings and shall comply with state highway department specifications regarding source, quality, gradation, liquid limit, plasticity index, and mix proportioning.

PART THREE – EXECUTION

3.01 SURFACE PREPARATION

A. Remove loose material from compacted subbase surface immediately before applying herbicide treatment or prime coat.

B. Proof roll prepared subbase surface to check for unstable areas and areas requiring additional compaction.

C. Notify General Contractor of unsatisfactory conditions. Do not begin paving work until deficient subbase areas have been corrected and are ready to receive paving.

D. Herbicide Treatment: Apply chemical weed control agent in strict compliance with manufacturer's recommended dosages and application instructions. Apply to compacted, dry subbase prior to application of prime coat.
E. Prime Coat: Apply as indicated on Construction Drawings, over compacted subgrade. Apply material to penetrate and seal, but not flood surface. Cure and dry as long as necessary to obtain penetration and evaporation of volatile gases.
F. Tack Coat: Apply to contact surfaces of previously constructed asphalt or Portland cement concrete and surfaces abutting or projecting into asphalt concrete pavement. Distribute at a rate indicated on Construction Drawings. Allow to dry until at proper condition to receive paving.
G. Exercise care in applying bituminous materials to avoid smearing of adjoining concrete surfaces. Remove and clean damaged surfaces.

3.02 PLACING MIX

A. General: Place asphalt concrete mixture on prepared surface, spread and strike-off. Spread mixture at minimum temperature of 225 degrees F. (107 degrees C.). Place inaccessible and small areas by hand. Place each course to required grade, cross-section, and compacted thickness.
B. Paving Placing: Place in strips not less than 10' wide, unless otherwise acceptable to Architect. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete base course for a section before placing surface course.
C. Joints: Make joints between old and new pavement, or between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density and smoothness as other sections of asphalt concrete course. Clean compact surfaces and apply tack coat.

3.03 ROLLING

A. General: Begin rolling when mixture will bear roller weight without excessive displacement.
B. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
C. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced area by loosening and filling, if required, with hot material.
D. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.
E. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.
F. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot asphalt concrete. Compact by rolling to maximum surface density and smoothness.
G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.04 TRAFFIC AND LANE MARKINGS

A. Cleaning: Sweep and clean surface to eliminate loose material and dust.

B. Striping Use chlorinated rubber base traffic lane-marking paint, factory-mixed, quick drying, and non-bleeding. Color: White

C. Do not apply traffic and lane-marking paint until layout and placement has been verified by the Architect.

D. Apply paint with mechanical equipment to produce uniform straight edges. Apply in 2 coats at manufacturer's recommended rates.

3.05 FIELD QUALITY CONTROL

A. General: Test in-place asphalt concrete courses for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable paving as directed by Engineer.

B. Thickness: In-place compacted thickness will not be acceptable if exceeding following allowable variation from required thickness:

Base course: ½", plus or minus

Surface course: ¼", plus or minus.

C. Surface smoothness: Test finished surface of each asphalt concrete course for smoothness, using 10' straightedge applied parallel with, and at the right angles to center line of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness.

Base Course Surface: ¼"

Wearing Course Surface: $^{3}/_{16}$"

Crowned Surfaces: Test with crowned template centered and at right angle to crown.

Maximum allowable variance from template: ¼".

D. Check surface areas at intervals as directed by Engineer.

END OF SECTION

SECTION 321600
CURBS AND SIDEWALKS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Preparation and placement of combination Portland cement concrete curb and gutter.
B. Preparation and placement of Portland cement concrete curb.
C. Preparation and placement of Portland cement concrete sidewalk.

1.02 RELATED SECTIONS

A. Section 310000 – Earthwork
B. Section 321123 – Aggregate Material.
C. Cast-in-place Concrete (See Architectural/Building Specifications).
D. State Highway Department Standard Specifications.
E. Construction Drawings.

1.03 REFERENCE STANDARDS

A. American Concrete Institute (ACI) latest edition.
   1. 304R Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.
   2. 308 Standard Practice for Curing Concrete.
B. American Society for Testing and Materials (ASTM) latest edition.
   1. A615 Deformed and Plan Billet-Steel for Concrete Reinforcement.
   2. C33 Concrete Aggregates.
   3. C94 Ready-Mixed Concrete.
   4. C150 Portland Cement.
   5. C260 Air-Entraining Admixtures for Concrete.
   6. C309 Liquid Membrane-Forming Compounds for Curing Concrete.
   7. C494 Chemical Admixtures for Concrete.
   8. D1751 Performed Expansion Joint Fillers for Concrete Paving and Structural Construction. (Nonextruding and Resilient Bituminous Types)
C. FS TT-C-800 – Curing Compound, Concrete, for New and Existing Surfaces.

1.04 QUALITY ASSURANCE

A. Establish and maintain required lines and elevations.
B. Check surface areas at intervals necessary to eliminate ponding areas. Remove and replace unacceptable work as directed by Owner.

1.05 SUBMITTALS

A. Submit materials certificate to the independent testing laboratory which is signed by materials producer and Contractor, certifying that materials comply with, or exceed, requirements specified herein.

1.06 PROJECT CONDITIONS

A. Maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize temporary striping, flagmen, barricades, warning signs, and warning lights as required.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use

straight forms, free of distortion and defects. Use flexible spring steel forms or laminated boards to from radius bends as required. Forms shall be of depth equal to depth of curbing or sidewalk, and so designed as to permit secure fastening together at tops. Coat forms with nonstaining type of coating that will not discolor or deface surface of concrete.

B. Reinforcing Bars: Deformed steel bars, ASTM A 615, Grade 40.

C. Concrete Materials: Comply with requirements of Section 033000 for concrete materials, admixtures, bonding materials, curing materials, and others as required.

D. Joint Fillers: Resilient premolded bituminous impregnated fiberboard units complying with ASTM D 1751, FS HH-F-341, Type II, Class A.

E. Joint Sealers: Non-priming, pourable, self-leveling polyurethane. Acceptable sealants are Sonneborn "Sonolastic Paving Joint Sealant, Sonneborn "Sonomeric CT 1 Sealant", Sonneborn "Sonomeric CT 2 Sealant, Mameco "Vulken 245", or Woodmont Products "Chem-Caulk".

2.02 MIX DESIGN AND TESTING

A. Concrete mix design and testing shall comply with requirements of Section 03300.

B. Design mix to produce normal weight concrete consisting of Portland cement, aggregate, water-reducing admixture, air-entraining admixture, and water to produce following:

1. Compressive Strength: 4,000 psi, minimum at 28 days, unless otherwise indicated on Construction Drawings.
2. Slump Range: 2 to 5 inches at time of placement.
3. Air Entrainment: 5 to 8 percent.

PART 3 - EXECUTION

3.01 PREPARATION

A. Proofroll prepared base material surface to check for unstable areas. Begin paving work only after unsuitable areas have been corrected and are ready to receive paving.

B. Remove loose material from compacted base material surface to produce firm, smooth surface immediately before placing concrete.

3.02 INSTALLATION

A. Form Construction:

1. Set forms to required grades and lines, rigidly braced and secured.
2. Install sufficient quantity of forms to allow continuance of work and so that forms remain in place a minimum of 24 hours after concrete placement.
3. Check completed formwork for grade and alignment to following tolerances:
   a. Top of forms not more than 1/8-inch in 10'-0".
   b. Vertical face of longitudinal axis, not more than ¼-inch in 10'-0".
4. Clean forms after each use and coat with from release agent as often as required to ensure separation from concrete without damage.

B. Concrete Placement:

1. Place concrete in accordance with requirements of Section 033000.
2. Do not place concrete until base material and forms have been checked for line and grade. Moisten base material if required to provide uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until set at required finish elevation and alignment.
3. Place Concrete using methods which prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator

away from joint assemblies, reinforcement, or side forms. Consolidate with care to prevent dislocation of reinforcing, dowel, and joint devices.

4. Deposit and spread concrete in continuous operation between transverse joints, as far as possible, if interrupted for more than ½ hour, place construction joint. Automatic machine may be used for curb and gutter placement. Machine placement shall be at required cross section, line, grade, finish, and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete as specified herein.

C. Joint Construction:

1. Contraction Joints: Construct concrete curb or combination concrete curb and gutter, where specified on Construction Drawings, in uniform sections of length specified on Construction Drawings. Form joints between sections either by steel templates, 1/8-inch in thickness, of length equal to width of curb and gutter, and with depth which will penetrate at least 2-inches below surface of curb and gutter; or with ¾-inch thick performed expansion joint filler cut to exact cross section of curb and gutter; or by sawing to depth of at least 2-inches while concrete is between 4 and 24 hours old. If steel templates are used, they shall be left in place until concrete has set enough to hold its shape, but shall be removed while forms are still in place.
2. Longitudinal Construction Joints: Tie concrete curb or combination concrete curb and gutter, where specified on Construction Drawings, to concrete pavement with ½-inch round deformed reinforcement bars of length and spacing shown on Construction Drawings.
3. Transverse Expansion Joints: Concrete curb, combination concrete curb and gutter, or concrete sidewalk shall have filler cut to exact cross section of curb, gutter, or sidewalk. Joints shall be similar to type of expansion joint used in adjacent pavement

D. Joint Filler: Extend joint fillers full-width and depth of joint, and not less than ½-inch or more than 1-inch below finished surface where joint sealer is indicated. Furnish joint fillers in 1-piece lengths for full width being placed, wherever possible. Where more than 1 length is required, lace or clip joint filler sections together.

E. Joints Sealants: Seal joints with approved exterior pavement joint sealants. Install in accordance with manufacturer's recommendations.

3.03 INSTALLATION PROCEDURES

A. The area to receive imprinted concrete shall have the sup-grade prepared as required as for any concrete slab on grade.

B. The formwork shall be installed in accordance with the drawings. The slab thickness shall be consistent with that of ordinary concrete slabs under the same conditions.

C. Provide reinforcement as specified.

D. Control joints and/or expansion joints shall be provided in accordance with the drawings and the guidelines established by the American Concrete Institute. As with any concrete slab, imprinted concrete usually contains construction joints, control joints and expansion joints. The contractor shall advise and work with the architect/engineer to determine the best location for these joints to minimize the visibility of the joints and to minimize unsightly cracking.

E. The concrete shall be placed and screeded to finished grade, and floated to a uniform surface using standard finishing techniques.

F. While the concrete is still in its plastic stage of set, the imprinting tools shall be applied to the surface.

G. Cure and Seal, or approved equal shall be applies in accordance with the manufacturer's recommendations immediately after the completing the imprinting process for.
H. After the initial curing period the surface of the slab shall be sealed.

3.04 BACKFILL

A. After concrete has set sufficiently, spaces on either side of concrete curb, combination concrete curb and gutter, or concrete sidewalk shall be refilled to required elevation with suitable material compacted in accordance with geotechnical report.

3.05 CLEANING AND ADJUSTING

A. Sweep concrete pavement and wash free of stains, discolorations, dirt, and other foreign material just prior to final inspection.
B. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials.

END OF SECTION

SECTION 321723
PAVEMENT MARKINGS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Preparation and application of painted pavement markings.

B. Preparation and application of paint on curbs, guard posts, and light pole bases.

1.02 RELATED SECTIONS

A. Section 310000 – Earthwork.

B. Section 321100 – Paving Base Course.

C. Section 321600 – Curbs and Sidewalks.

D. Construction Drawings.

1.03 REFERENCE STANDARDS

A. FS TTP-85E

1.04 PROJECT CONDITIONS

A. Maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize flagmen, barricades, warning signs, and warning lights as required.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Paint shall be non-bleeding, quick-drying, alkyd petroleum base paint suitable for traffic-bearing surface and shall meet FS TTP-85E and be mixed in accordance with manufacturer's instructions before application.

B. Performed pavement markings shall be Stamark Intersection Grade Tape Series A420 as manufactured by 3M Traffic Control Materials Division, or approved equal.

PART 3 – EXECUTION

3.01 PREPARATION

A. Sweep and Clean surface to eliminate loose material and dust.

B. Where existing pavement markings are indicated on Construction Drawings to be removed or would interfere with adhesion of new paint, a motorized abrasive devise shall be used to remove the markings. Equipment employed shall not damage existing paving or create surfaces hazardous to vehicle or pedestrian traffic. Within public rights-of way, method of marking removal shall be approved by appropriate governing authority.

3.02 APPLICATION

A. Apply two coats of paint at manufacturer's recommended rate, without addition of thinner, with maximum 100 square feet per gallon. Apply with mechanical equipment to produce uniform straight edges. At sidewalk curbs and crosswalks, use straightedge to ensure uniform, clean, and straight stripe.

B. Install pavement markings according to manufacturer's recommended procedures for the specified material.

C. Following items shall be painted with colors noted below:

1. Pedestrian Crosswalks: White
2. Exterior Sidewalk Curbs, Light Pole Bases, and Guard posts: as selected by Architect.
3. Fire Lanes: Red or per local code.
4. Lane Striping where separating traffic moving in opposite directions: Yellow
5. Lane Striping where separating traffic moving in the same direction: White
6. Handicap Symbols: Blue or per local code

7. Parking Stall Striping: White, unless otherwise noted on Construction Drawings
8. Associate Parking Area: White, unless otherwise noted on Construction Drawings

END OF SECTION

SECTION 32 92 00

TURF AND GRASSES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Preparation and seeding disturbed areas of site that are not covered by building, pavement, walks, planters, or other improvements.

1.2 RELATED SECTIONS

A. Section 015000 – Temporary Facilities and Controls.

B. Section 310000 – Earthwork.

1.3 SUBMITTALS

A. Submit seed vendor's certification for required grass seed mixture, indicating percentage by weight, and percentages of purity, germination, and weed seed for each grass species.

B. Upon seeding, submit written maintenance instruction recommending procedures for maintenance of seeded areas.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver seed and fertilizer materials in original unopened containers, showing weight, analysis, and name of manufacturer. Store in a manner to prevent wetting and deterioration.

1.5 PROJECT CONDITIONS

A. Work notification: Notify Architect at least 7 working days prior to start of seeding operations.

B. Protect existing utilities, paving and other facilities from damage caused by seeding operations.

C. Perform seeding work only after planting and other work affecting ground surface has been completed.

D. Restrict traffic from seeded areas until seed is established. Erect signs and barriers as required.

E. Provide hose and watering equipment as required.

F. Furnishing and placement of topsoil shall be limited to locations shown on the drawings and shall be by earthwork contractor and is not a part of the seeding work.

G. Do not sow immediately following rain or when wind velocity exceeds 5 mph.

H. Do not lay sod when ground is frozen.

1.6 WARRANTY

A. Contractor shall guarantee the Owner a solid stand of grass, regardless of season, weather conditions or other factors.

B. Guaranty: The lawn shall be guaranteed for the duration of one full calendar year after planting, and shall be alive an in satisfactory growth at the end of the guaranty period. If it is not alive and growing, it shall be replaced at no additional cost to the Owner.

D. Replacements: Replacements are subject to all requirements stated in this specification and subject to inspection by the Architect.

E. Repair grades, lawn areas, paving and any other damage resulting from replacement seeding operations, at no additional cost to the Owner.

F. At the close of warranty period, one year after acceptance of the work, notify the Owner and Architect in writing of the date for warranty inspection. Make any repairs or replacements identified by the Architect in the Warranty Inspection.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Seeds shall meet the requirements of applicable seed laws and shall be tested in accordance with the most current edition of the U.S. Department of Agriculture Handbook No. 30, Testing Agricultural and Vegetable Seed. Seeds shall be from the last preceding crop and comply with the requirements outlined below for purity and germination. Each variety of seed shall be furnished in separate, strong bags with each bag being fully tagged or labeled to show the variety, weight, purity, germination, and test data prescribed by law. All test results shall be fully certified by the vendor or by a recognized seed testing agency. Seeds found not to comply with specification

requirements shall be subject to rejection.

When mixing or forming seed mixture, the seeds shall be carefully and uniformly mixed. Seeds shall not be mixed until each variety of seed to be used in the mix has been inspected and/or tested separately and approved.

Seed Varieties	Purity, Minimum %	Germination, Minimum %
Rebel II Fescue (Festuca arundinacea, variety Rebel II)	95	85
Falcon II Fescue (Festuca arundinacea, variety Falcon II)	95	85

B. Seeding materials shall be free from seeds or bulbets of Wild Onion (Allium vineal), Canada Thistle (Cirsium arvense), and Johnson Grass (Sorghum halepense).

C. Seed species shall not contain more than six seeds per ounce of the seed of any of the following noxious weeds or the seeds of any other weed specifically listed as noxious:

Bindweed (Convolvulus arvensis)	Oxyedaisy (Chrysanthemum leucantheumum)
Buckhorn (Plantago lanceolata)	
Corncockle (Agrostemmo githago)	Quackgrass (Agropyron repens)
Dodder (Cuscuta species)	Sorrel (Rumex acetosella)

D. Seed species shall not contain an excess of 2 percent by weight of weed seeds, noxious or otherwise.

E. Topsoil - Seeded areas so indicated on the drawing shall receive a minimum of topsoil as provided for in Section 310000 – Earthwork and shall be a part of the earthwork contract.

F. Fertilizers - Fertilizers shall be those readily available commercially. The application of fertilizer shall be at a rate of 200 pounds Ureaform (38-0-0) per acre with either 400 pounds of 15-15-15 per acre of 600 pounds of 6-12-12. Fertilizer rates shall be modified by the recommendations of the soil test and shall be approved by the Architect in writing.

G. Limestone - Limestone shall contain no less than 85 percent calcium carbonate by weight. It shall be crushed so that at least 85 percent will pass a no. 10 sieve. The application of limestone shall be at the rate of 2 tons per acre. Hydrated lime may be substituted at a rate of 1 ton per acre. Limestone rates shall be modified by the recommendations of the soil test and shall be approved by the Architect in writing.

H. Straw Mulch - Clean oat or wheat straw well seasoned before bailing, free from mature seed bearing stalks or roots of prohibited or noxious weeds. Use straw on slopes no steeper than 4:1 unless a tackifier/binder is applied.

I. Wood Cellulose Fiber Mulch - Degradable green dyed wood cellulose fiber of 100 % recycled long fiber pulp, free from weeds or other foreign matter toxic to seed germination and suitable for hydromulching. Use for hydromulching in lieu of straw on erosion prone slopes greater than 4:1 or drainage swales.

J. Tackifier - Liquid concentrate diluted with water forming a transparent 3-dimension film like crust permeable to water and air and containing agents toxic to seed germination. Use tackifier on erosion prone slopes to hold either wood cellulose fiber mulch or straw.

Acceptable Manufacturers and types:
Polybind DLR: Celtite, Inc., Cleveland, OH
Curasol AK: American Hoescht Corp., Elk Grove, IL

K. Water - Free of substances harmful to seed growth. Hoses or other methods of transportation shall be furnished by the Contractor.

2.2 SOD

A. Provide strongly rooted cultivated grass sod, not less than 1 year old, free of weeds and undesirable native grasses.

B. Provide sod composed of Kentucky 31 Fescue with not more than 20% of other grasses and legumes.

C. Broken sod pads and pads with uneven ends will be rejected. Sod pad incapable of supporting their own weight when suspended vertically with a firm grip on the upper two corners of the pad will be rejected.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine finish surfaces, grades, topsoil quality, and depth. Do not start seeding work until unsatisfactory conditions are corrected and acceptable for seeding.

3.2 PREPARATION

A. Limit preparation to areas that will be immediately seeded.

B. Loosen soil and topsoil of seeded areas to minimum depth of 4". Remove stones over 1" in any dimension and sticks, roots, rubbish and extraneous matter. It is strongly recommended that scarifying and preparation of seedbeds on cut and fill slopes be accomplished with tools or equipment specially designed for this purpose. Small furrows or grooves formed in the slopes shall be horizontal or as nearly horizontal as practical. The work shall be performed only when the ground is in a workable and tillable condition as determined by good farming practices.

C. Grade seeded areas to a smooth, free drainage even surface with a loose, moderately coarse texture. Roll and rake, remove ridges, and fill depressions as required to drain.

D. Apply limestone, at rate determined by the soil test, to adjust pH of topsoil. Distribute evenly by machine and incorporate thoroughly into topsoil.

E. Apply fertilizer to all seeded areas at the approved rates as determined by the soil test.

F. Apply fertilizers by mechanical rotary to drop type distributor, thoroughly and evenly incorporated with soil to a depth of 3" by discing or other approved method. Fertilize areas inaccessible to power equipment with hand tools and incorporate into soil.

G. Restore prepared areas to specified condition if eroded, settled, or otherwise distributed after fine grading and prior to seeding.

3.3 INSTALLATION

A. Seeding:
   1. Seed immediately after preparation of bed.
   2. Seed all areas within and adjoining project limits disturbed as a result of construction operations.
   3. Perform seeding operations when the soil is dry and when winds do not exceed 5 miles per hour velocity.
   4. Apply seed with a rotary or drop type distributor. Install seed evenly by sowing equal quantities in 2 directions, at right angles to each other.

B. Mulching:
   1. Place straw mulch on seeded areas within 24 hours after seeding.
   2. Place straw mulch uniformly in a continuous blanket at the rate of 2-1/2 tons per acre, or two 50 lb. bales per 1,000 sq. ft. of area. A mechanical blower may be used for straw mulch application when acceptable to the Architect.
   3. Anchor straw mulch with liquid tackifier applied uniformly at a rate of 60 gal. Per acre on slopes greater than 4:1.
   4. Protect structures, walls, paving, plantings, and all non-seeded areas from liquid tackifier over-spray.

3.4 SODDING

A. Lay sod tight with no open joint and no overlapping. Stagger strips to offset previous courses.

B. Roll or tamp lightly to ensure contact with topsoil. Place sifted topsoil into cracks between pieces of sod.

C. On slopes where grade is 6” per foot or greater, secure sod with wood peg to eliminate slippage.

D. Water sod thoroughly with fine spray immediately after installation.

3.5 MAINTENANCE

A. Maintain seeded areas until completion and acceptance of the entire project or not less than 30 days after completion and acceptance of seeding operations.

B. Maintain seeded areas, including watering, spot weeding, mowing, application of herbicides, fungicides, insecticides, and re-seeding until a full, uniform stand of grass free of weeds, undesirable grass species, disease, and insects is achieved and accepted by the Architect.

1. Water periodically to maintain adequate surface soil moisture for proper seed germination. Continue watering for not less than 30 days. Thereafter apply water as required until provisional acceptance.

2. Repair, rework, and re-seed all areas that have washed out, are eroded, or do not catch.

3.6 CLEAN UP AND PROTECTION

A. During seeding work, keep pavements clean and work area in an orderly condition.

B. Upon completion of work, clear grounds of debris, superfluous materials and all equipment. Remove from site to satisfaction of Architect.

C. Protect seeding work and materials from damage due to landscape operations, operations by other contractors and trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged seeding as directed, at no additional cost to the Owner.

3.7 INSPECTION AND ACCEPTANCE

A. Upon completion of work, notify the Architect at least ten (10) days prior to requested date of inspection for acceptance. Where inspected work does not comply with requirements, replace rejected work and continue specified maintenance until re-inspected by the Architect and found to be acceptable.
   1. Seeded areas will be acceptable provided all requirements, including maintenance, have been complied with, and a healthy, uniform, close stand of the specified mixture is established free of weeds, undesirable species, disease, and insects.
   2. No individual seeded areas shall have bare spots or unacceptable cover totaling more than 2 % of the individual areas, in areas requiring inspection.

B. Upon satisfactory completion of repairs and, or replacements, the Architect certifies, in writing, the acceptance of the work in total.

3.8 SCHEDULE

A. Establish lawn by seeding or sodding areas disturbed by grading, excavation, stripping and other construction activities.

B. Lay sod in the following lawn areas or as indicated on Drawings:
   1. 6 ft. diameter around drain inlets and outlets.
   2. 2 ft. adjacent to sidewalks.
   3. Slopes where grades is 6” per foot or greater.

END OF SECTION

SECTION 334000
STORM DRAINAGE

PART 1- GENERAL

1.01 SUMMARY

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division –1 Specification sections, apply to work of this section.

B. These specifications cover all required equipment and the complete installation of the systems shown on the attached drawings and related items.

C. Scope of the work includes furnishing and complete installation of the equipment and materials for the storm drainage system, with all auxiliaries, ready for owner's use. Storm drain piping from connection at gutter downspouts and/or connection with underground piping at a point five feet outside of the building, to the termination at manholes or catch basins are included in the scope of this section.

D. Storm drainage piping shall comply with the 2012 International Plumbing Code.

E. The Contractor shall pay for all permits and fees.

F. The drawings indicate generally the locations of plumbing fixtures, apparatus, piping, etc., but if, before installation, it is found necessary to change the location of same to accommodate the conditions at the building, such changes shall be made without additional cost to the Owner and as directed by the Owner.

1.02 REFERENCES

A. Section 221400 – Storm Drainage (inside building)

B. Section 077100 – Manufactured Roof Specialties (for gutters and downspouts)

C. International Plumbing Code – 2012 Edition

1.03 SUBMITTALS

A. Provide submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedure Section.

B. Submittals are required for fixtures and equipment scheduled on the drawings.

1.04 DELIVERY, STORAGE AND HANDLING

A. General: Comply with Division 1 Product Requirements Sections.

B. Furnish the Owner 3 sets of as-built drawings upon completion of work.

1.05 WARRANTY

A. Project Warranty: Refer to Conditions of the Contract for additional project warranty provisions.

B. Furnish one (1) year service and guarantee on all labor and material.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Storm drainage piping shall be HDPE gravity sewer pipe – "ADS N-12 ST in accordance with ASTM F2648.

2.02 EQUIPMENT

A. Cleanouts shall be as indicated on drawings. Backfill shall be 100% compacted around vertical cleanout extension prior to pouring concrete.

PART 3 – EXECUTION

3.01 TRENCHING AND BACKFILLING

A. Protect all private roads and walks and maintain them during course of the work. Repair all damage at Contractor's expense.

B. Erect construction fencing around all excavations before starting work.
C. Provide and maintain guard lights at all barricades, railing, obstructions, in streets, roads, or sidewalks, and all trenches or adjacent to public walks or roads.
D. Remove and replace at Contractor's expense all work damaged by failure to provide protection.
E. Excavate trenches of sufficient width for proper installation of work. When depth of backfill over piping exceeds 10 feet, keep trench below level of top of pipe as narrow as practical.
F. Perform trenching in accordance with OSHA and local safety regulations.
G. Excavate all trenches to at least six inches below bottom elevation of pipe at all points. Grade trench bottom evenly. Lay piping in trenches on 6" bed of crushed stone with stone backfilled to 12" above top of pipe by hand.
H. Trenches shall provide uniform bearing. Where rock is encountered, excavate 2' below the pipe and refill to pipe grade with gravel.
I. Backfill trenches to grade only after piping has been inspected, tested, approved and location of pipe and appurtenances has been recorded. Tamp to 95% compaction. Under pavement, walks, and other surfacing, backfill shall be tamped solidly in layers not thicker than 6". Exclude all cinders and rubbish from trenches in which pipes are laid.
J. If unstable soil conditions are encountered, erect adequate supports needed in an approved manner to adequately support the underground piping.

3.02 INSTALLATION

A. The location of existing underground utilities are approximate locations only. Before beginning work determine the exact location of all existing utilities. The contractor shall pay for and repair all damages caused by failure to exactly locate and preserve any and all underground utilities. Connect to the public storm sewer system at a catch basin or other standard connection provided.
B. Elevations shown on the drawings are to the invert of all gravity piping.
C. Adjust inverts to keep tops of pipe inline where pipe size changes.
D. Confirm elevation of existing storm drain connection point and grade storm drain at least 1/4" per foot unless otherwise indicated on drawings.
E. All piping is shown diagrammatically on the drawing. Determine exact locations in the field. Coordinate exact locations with all trades before installation.
F. Lay storm drainage piping to uniform grade. Make changes in directions of drain piping with long bends. No screwed joints are permitted in drainpipes, except as described herein.
G. Provide and install cleanouts where shown on the drawings, at 100 feet intervals, and as required by local codes. Extend cleanouts through and terminate flush with the finished grade. Terminate with C.I. plugs.

3.02 FIELD QUALITY CONTROL

A. Flush with water in sufficient volume to obtain free flow through each line. Remove all obstruction and correct all defects discovered. Remove all silt and trash from structures prior to final acceptance of work.

END OF SECTION

SECTION 334100
STORM SEWERS AND PIPE CULVERTS

PART 1- GENERAL

1.01 SECTION INCLUDES

A. This work shall consist of the placing of precast concrete pipe, corrugated metal pipe, structural plate pipe and pipe arches, high density polyethylene (HDPE) corrugated pipe (with smooth waterway), and all fittings as called for on the drawings and in accordance with the Specifications including trench excavation, bedding, and backfill.

B. Each pipe shall be clearly marked to show its class or gauge, date of manufacture, name of manufacturer, and mark of approval by an approved commercial testing laboratory prior to delivery.

C. All pipe and special fitting shall be new materials, which have not been previously used and free of any defects or damage.

D. Pipe sizes, class or gauge, and type of bituminous coating will be shown on the drawings. Size of the pipe is nominal inside diameter.

E. All materials used in this construction, in addition to the general requirement of these Specifications, unless otherwise stipulated, shall conform to the following:

1. Storm sewers and pipe culverts shall conform to Subsection 607 of the Tennessee Department of Transportation, Standard Specifications for Road and Bridge Construction, 1981 or latest revisions.
2. HDPE pipe shall conform to AASHTO M252, M294, MP7 and shall be dither AASHTO Type "S: or AASHTO Section 30 or ASTM D2321 and any details shown on the drawings or as recommended by the manufacturer.

1.02 EXISTING UTILITIES

A. All existing sewers, water lines, gas lines, underground conduits, telephone lines, electric lines or other utilities or structure in the vicinity of the work shall be carefully protected by the Contractor from damage at all times.

END OF SECTION

SECTION 33 46 13

FOUNDATION DRAINAGE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Sub-surface foundation drainage.
B. Surface drainage products for gutter & downspout systems.

1.2 RELATED SECTIONS

A. Section 310000 – Earthwork.
B. Section 076200 – Sheet Metal Flashing and Trim.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Foundation Drainage:
   1. Foundation drain pipe: perforated, 4 inch diameter corrugated polyethylene tubing or as indicated on Drawings.
   2. Sleeves: where tubing passes through the foundation wall, provide standard weight 6 inch diameter cast iron pipe sleeves, or size as appropriate for tubing.
   3. Accessories and fittings: as required to connect sections of tubing and complete the work.

B. Surface Drainage:
   1. Splash Blocks: Modern Precast, 30” x 12” splash block, ‘Concrete Gray’, or equivalent by other manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install drainage pipe where indicated on drawings and slope to drain.
B. Backfill with porous crushed stone backfill material.
C. Install splash blocks sloped to drain away from structure.

END OF SECTION

SECTION 334900
STORM DRAINAGE STRUCTURES

PART 1- GENERAL

1.01 SECTION INCLUDES

A. This work shall consist of constructing the following drainage structures: manholes, catch basins, inlets and junction boxes. Construction shall be in reasonable close conformity to the lines, grades, dimension and sizes shown on the drawings or as directed by the Engineer.

B. The height or depth of these drainage structures will vary with location, but unless otherwise shown on the drawings, shall be such that the frames will match the line and grades of the parking area, roadway surface or grasses areas and the invert will be at the designated elevations.

C. Cast iron frames, grates, and covers shall be provided as specified on the drawings.

D. Manholes, inlets, catch basins, and junction boxes shall conform to the Standard Detail Drawings of the Tennessee Department of Transportation unless otherwise noted on the drawings. Deviations from these drawings may be approved, by submitting a detailed drawing to the Engineer before construction begins.

E. All materials used in this construction, in addition to the general requirements of these Specifications, unless other wise stipulated, shall conform to the following:

1. Drainage structures shall conform to Subsection 611 of the Tennessee Department of Transportation, Standard Specifications for Road and Bridge Construction, 2015 or latest revisions.

END OF SECTION